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6 TANK BARGE DAMAGE PROFILE ANALYSIS.

10 R. D. LEIS

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16. Abstract This report describes the analysis of tank barge damage as reported in special survey reports from Coast Guard field inspectors. The damages were analyzed in terms of general type, frequency of occurrence in various areas of the barge and general size to develop a profile for identifying temporary repair application and operational environment for the establishment of suitable evaluation test procedures.			
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## TANK BARGE DAMAGE PROFILE ANALYSIS

by

R. D. Leis

### 1.0 INTRODUCTION

This report presents the results of one portion of the program entitled "Tank Barge Damage Survey/Temporary Repair Study" (Contract No. DOT-CG-23223-A, Task 16) conducted by Battelle's Columbus Laboratories for the U. S. Coast Guard. This program is the second phase of a three-phase program to develop the information necessary to evaluate temporary repairs to tank barges. Phase I, conducted by the National Maritime Research Center, Galveston, Texas, consisted of a "state-of-the-art" study of tank barge temporary repairs. Phase II had three objectives.

- (1) To analyze the effectiveness of double barriers in preventing cargo tank penetration in tank barges.
- (2) To analyze and define the profile of damages which occur to tank barges.
- (3) To develop suitable test procedures for the compilation of performance parameters of temporary repair materials which are pertinent to the assessment of their adequacy in use. These will be recommended for execution in Phase III of the overall tank barge temporary repair program.

This report presents the results of Item (2) above--the analysis of tank barge damage profiles.

### 2.0 SOURCE MATERIAL

The source material upon which this analysis is based is a compilation of over 700 special damage survey reports submitted to Coast Guard Headquarters by field inspection units (see Exhibit 1). The damages reported were those observed during approximately one year on scheduled inspections and special examinations; as, for example, would follow a casualty or major repair activity.

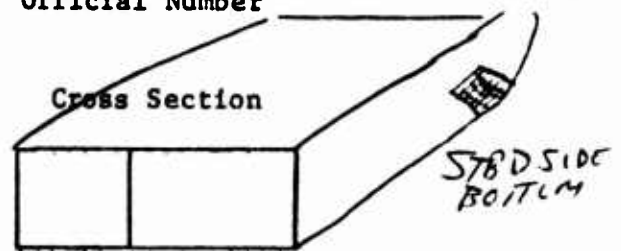
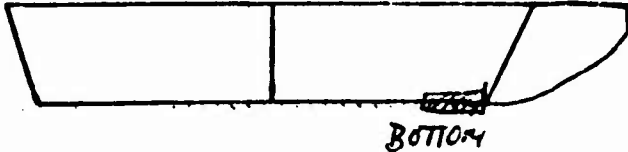
5

## EXHIBIT 1. SAMPLE DAMAGE SURVEY SHEET

Vessel Name \_\_\_\_\_

Official Number \_\_\_\_\_

## 1. Profile Section



(Indicate damage on above sketches)

## 2. Type of damage (holed, fractured, wasted, etc.)

UPSET

## 3. Location of center of damage

a. Longitudinally from nearest end of barge

35'

b. Vertically from bottom

0'

c. Longitudinal extent of damage

17'

d. Vertical extent of damage

0'

e. Transverse extent of damage

8'

## 4. Single or double sided

DOUBLE

a. Was side cargo containment boundary penetrated?

NO

b. Would the construction of 24" double sides have prevented the side cargo containment boundary from being penetrated?

N/A

## 5. Single or double bottom

DOUBLE

a. Was bottom cargo containment boundary penetrated:

NO

b. Would the construction of 24" double bottoms have prevented the bottom cargo containment boundary from being penetrated?

N/A

## 6. The last cargo carried in the tank affected/Did tank carry cargo at time of damage (if info is readily available)?

N/A

## 7. Probable cause of damage

GROUNDING

## 8. Cost of permanent repairs/weight of replacing materials

\*2000 / 3700\*

The information contained in these survey forms was analyzed and each separate damage incident was coded onto data sheets. An example of the data sheet and coding instructions is given in Appendix A. These data were then merged with the Vessel File (maintained in G/MIS) for all barges in which damages were reported. This was necessary to obtain a complete data base which included physical barge descriptors--such as key dimensions--which were necessary for the immediate analysis purposes or may be necessary for future analyses. Appendix B contains the data record layout which resulted. The data base submitted to G/MIS is in accordance with this layout. A total of 1,239 separate damage incidents survived this process--after normal attrition due to incomplete survey forms or the lack of a vessel "match" with the Vessel File.

These data were loaded onto the INFONET\* system for analysis using the SALTS (Safety Analysis Logic Tree System) developed for the Coast Guard by Battelle. SALTS is an on-line interactive computerized system designed to facilitate the analysis of data. The system provides the analyst with the means to create an analytical tool, based on fault-tree logic and database sort criteria, for characterizing the contents of the data. This tool is created by the user in the form of a "tree" whose structure is based on nodes connected by logic gates.

By comparing the data elements of Appendix A with those supplied in Exhibit 1, it will be noted that considerably more information was coded than was specifically submitted on the survey forms. These added elements were desirable for a more complete analysis capability. They were, in most cases, deduced from the totality of information provided on the survey reports. For example, end-void information was not supplied. However, if the barge sustained a hole in the end with no tank penetration, the existence of an end void can be assumed with reasonable certainty.

Other desired data elements, however, were not supplied and could not be deduced with certainty. For example, the transverse location of damage was not requested. A rake end on a barge caused problems in locating

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\* SALTS was implemented on Computer Science Corporation's INFONET System. INFONET is an acronym coined by CSC to denote information network.

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end damage. Many times key questions were not answered. These data deficiencies, when combined with similar data deficiencies for some vessels in the Vessel File (such as the lack of key dimensions), resulted in something less than a comprehensive and accurate data base. The project staff attempted to compensate for some of these deficiencies--again by inference. The net result is a data base which is compromised to some degree.

This discussion is not given to dilute the reader's confidence in the following analysis results. However, he is cautioned to observe the trends discussed and not to dwell on the accuracy of any specific number. In general, these inaccuracies will be on the order of 1 to 2 percent with the exception of analyses which compound inferences. In these latter cases, special notice will be given.

### 3.0 CONCLUSIONS

The analyses performed in this task were aimed at (1) generating tank barge damage information pertinent to the understanding of tank barge damages and (2) developing damage parameters pertinent to the establishment of test procedures for temporary repairs. As such, there are no specific conclusions. Rather, the findings are embodied in the analyses performed as discussed in the following section.

### 4.0 PROGRAM ANALYSES

The general approach used in selecting the analyses to be performed in this task was to analyze the barge damage data in general form and move toward the specific forms. Appendix D, a compilation of SALTS results\*, is arranged in this manner. Exhibits D-1 through D-8 examine the incidence of all damage, hull ruptures, cracks, and holes with respect to the bow and stern for various areas of the barge. Exhibits D-9 through D-12 examine side damage in a longitudinal and vertical location matrix for hull ruptures, cracks, holes, and wasted through damage types, respectively. Exhibit D-13

\* The event pool used for these analyses is given in Appendix C.

examines the crack lengths sustained; Exhibit D-14 examines the area of holes sustained; and Exhibit D-15 examines the areas of wasted through damage sustained.

In general, all analyses reference a specific area of a barge-- such as side plane. These areas are defined in Exhibit 2. In this exhibit, the "codes" given in parenthesis correspond to the names used in the exhibits in Appendix D. For example, PAS means Plane Area Side. In the discussions which follow, these codes will not be used. They are introduced here only for the reader who understands SALTS and wishes to examine Appendix D for his own analytical purposes.

#### 4.1 BARGE DAMAGE FREQUENCY BY TYPE AND LOCATION

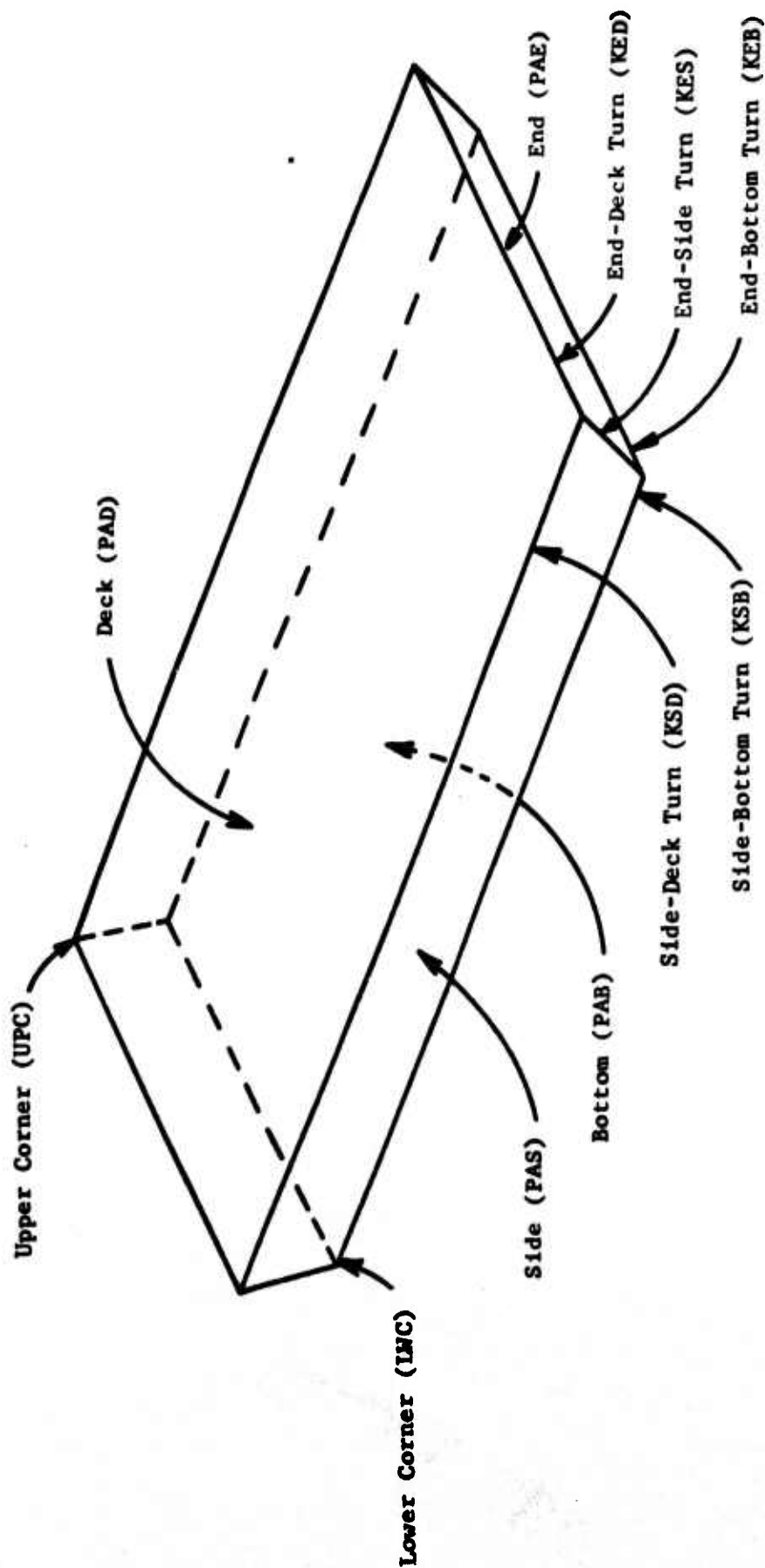
The first set of analyses was aimed at defining the basic types of damage and their occurrence with relation to various areas of the barge (Exhibits D-1 through D-8). Exhibit 3 summarizes these results. In this exhibit, the number of incidents of reported damage and subsequent hull rupture to each major barge area is given. In addition, the hull-rupture incidents are further subdivided into basic types: cracks and fractures, holes, and wasted-through areas. Each of these damage types was further analyzed to determine their frequency of occurrence in percentage intervals of the barge side profile.

Exhibits 4 and 5 were constructed from Exhibit 3. These exhibits show, in graphic form, the relative frequency of damage and hull rupture which occur in major barge areas. They reflect the dominance of damage to planes--in terms of both reported incidents and hull ruptures. The knuckles, or intersections of basic planes, however, sustain sufficient damage for concern in identifying the application environment for temporary repairs.

Exhibit 6 shows the distribution of damage incidents and their components with relation to the side profile of the barge. For example, approximately 30 percent of all damages are incurred within the first 10 percent of the barge. This is composed of the following:

(9)

EXHIBIT 2. TANK BARGE DAMAGE AREAS--DEFINITIONS USED IN SALTS ANALYSES



DAMAGE AREA DEFINITIONS

**EXHIBIT 3. TANK BARGE DAMAGE PROFILE--SUMMARY LOCATIONS BY TYPE OF  
DAMAGE AND BARGE AREA DAMAGED**  
Number of Incidents with Centerline Location in Specified  
Interval--Intervals are Percent of Barge Length Referenced  
from Bow

Type of Damage	Barge Area Damaged	Total Number of Incidents	Percent									
			0-10	10-20	20-30	30-40	40-50	50-60	60-70	70-80	80-90	90-100
All incidents	All	1289	351	148	104	87	95	48	44	46	62	170
Null ruptures	Ditto	724	225	84	59	42	47	25	26	28	36	113
Cracks/fractures	"	419	119	51	34	22	28	17	14	16	18	74
Holes	"	331	117	39	27	22	17	10	14	10	19	41
Wasted through	"	21	5	--	2	2	5	1	1	2	--	2
All incidents	Side plane	338	78	44	35	28	23	17	11	16	22	32
Null ruptures	Ditto	226	57	28	28	13	16	10	9	10	17	24
Cracks/fractures	"	152	35	20	15	9	10	9	6	7	9	19
Holes	"	83	24	8	13	6	4	3	5	3	9	6
Wasted through	"	4	2	--	--	--	2	--	--	--	--	--
All incidents	Bottom plane	246	17	47	33	36	29	15	17	12	15	12
Null ruptures	Ditto	128	11	27	15	19	13	7	10	7	7	7
Cracks/fractures	"	54	4	13	8	6	8	1	5	4	3	1
Holes	"	71	7	15	6	14	4	5	4	2	4	6
Wasted through	"	9	1	--	2	1	2	1	1	1	--	--
All incidents	Deck plane	47	10	5	6	3	3	--	1	4	5	3
Null ruptures	Ditto	25	5	2	1	1	3	--	1	3	2	3
Cracks/fractures	"	16	2	1	1	--	2	--	--	2	2	3
Holes	"	11	3	2	--	1	1	--	1	1	1	--
Wasted through	"	--	--	--	--	--	--	--	--	--	--	--
All incidents	End plane	134	86	7	--	--	--	--	--	--	--	41
Null ruptures	Ditto	86	56	1	--	--	--	--	--	--	--	29
Cracks/fractures	"	47	30	1	--	--	--	--	--	--	--	16
Holes	"	42	30	--	--	--	--	--	--	--	--	12
Wasted through	"	2	--	--	--	--	--	--	--	--	--	2
All incidents	Turn-side/bottom	141	12	24	15	10	23	9	10	8	11	10
Null ruptures	Ditto	93	8	12	11	2	9	4	4	5	5	4
Cracks/fractures	"	45	3	7	7	1	5	3	2	3	2	3
Holes	"	37	5	6	6	1	6	2	2	2	2	2
Wasted through	"	1	--	--	--	--	--	--	--	--	--	--
All incidents	Turn-side/deck	80	15	5	12	10	8	5	3	4	5	5
Null ruptures	Ditto	43	7	4	4	7	4	3	1	1	4	2
Cracks/fractures	"	30	5	4	3	6	3	3	--	--	1	1
Holes	"	13	2	1	2	--	1	--	1	--	3	1
Wasted through	"	2	--	--	--	1	--	--	--	1	--	--
All incidents	Turn-end/side	78	43	2	1	--	--	--	--	--	--	32
Null ruptures	Ditto	48	23	--	--	--	--	--	--	--	--	25
Cracks/fractures	"	31	13	--	--	--	--	--	--	--	--	18
Holes	"	18	11	--	--	--	--	--	--	--	--	7
Wasted through	"	--	--	--	--	--	--	--	--	--	--	--
All incidents	Turn-end/deck	39	28	--	--	--	--	--	--	--	--	11
Null ruptures	Ditto	33	24	--	--	--	--	--	--	--	--	9
Cracks/fractures	"	20	14	--	--	--	--	--	--	--	--	6
Holes	"	15	12	--	--	--	--	--	--	--	--	3
Wasted through	"	--	--	--	--	--	--	--	--	--	--	--
All incidents	Turn-end/bottom	49	31	8	2	--	--	--	--	--	1	6
Null ruptures	Ditto	21	16	5	--	--	--	--	--	--	--	--
Cracks/fractures	"	7	5	2	--	--	--	--	--	--	--	--
Holes	"	18	14	4	--	--	--	--	--	--	--	--
Wasted through	"	1	1	--	--	--	--	--	--	--	--	--
All incidents	Upper corner	18	7	--	--	--	--	--	--	--	--	11
Null ruptures	Ditto	10	4	--	--	--	--	--	--	--	--	6
Cracks/fractures	"	9	3	--	--	--	--	--	--	--	--	6
Holes	"	2	1	--	--	--	--	--	--	--	--	1
Wasted through	"	--	--	--	--	--	--	--	--	--	--	--
All incidents	Lower corner	37	23	5	--	--	--	--	--	--	--	7
Null ruptures	Ditto	21	13	4	--	--	--	--	--	--	--	4
Cracks/fractures	"	7	4	2	--	--	--	--	--	--	--	1
Holes	"	13	8	2	--	--	--	--	--	--	--	3
Wasted through	"	1	1	--	--	--	--	--	--	--	--	--
All incidents	Massive area	12	1	1	--	--	3	2	1	2	1	--
Null ruptures	Ditto	9	1	1	--	--	2	1	1	2	1	--
Cracks/fractures	"	5	1	1	--	--	--	1	1	--	1	--
Holes	"	5	--	1	--	--	1	--	1	2	--	--
Wasted through	"	1	--	--	--	--	1	--	--	--	--	--

EXHIBIT 4. FREQUENCY OF DAMAGE IN MAJOR BARGE AREAS

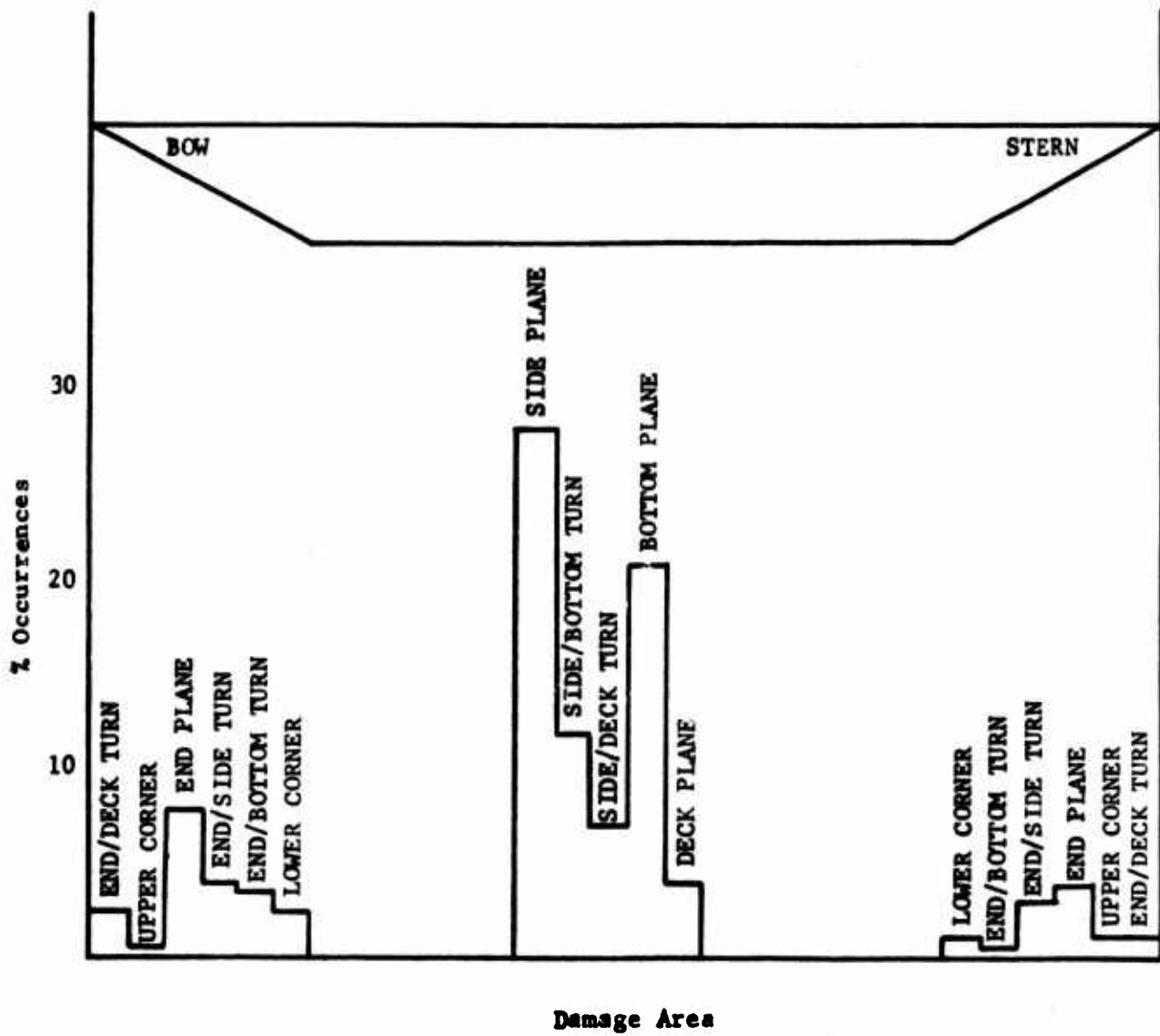
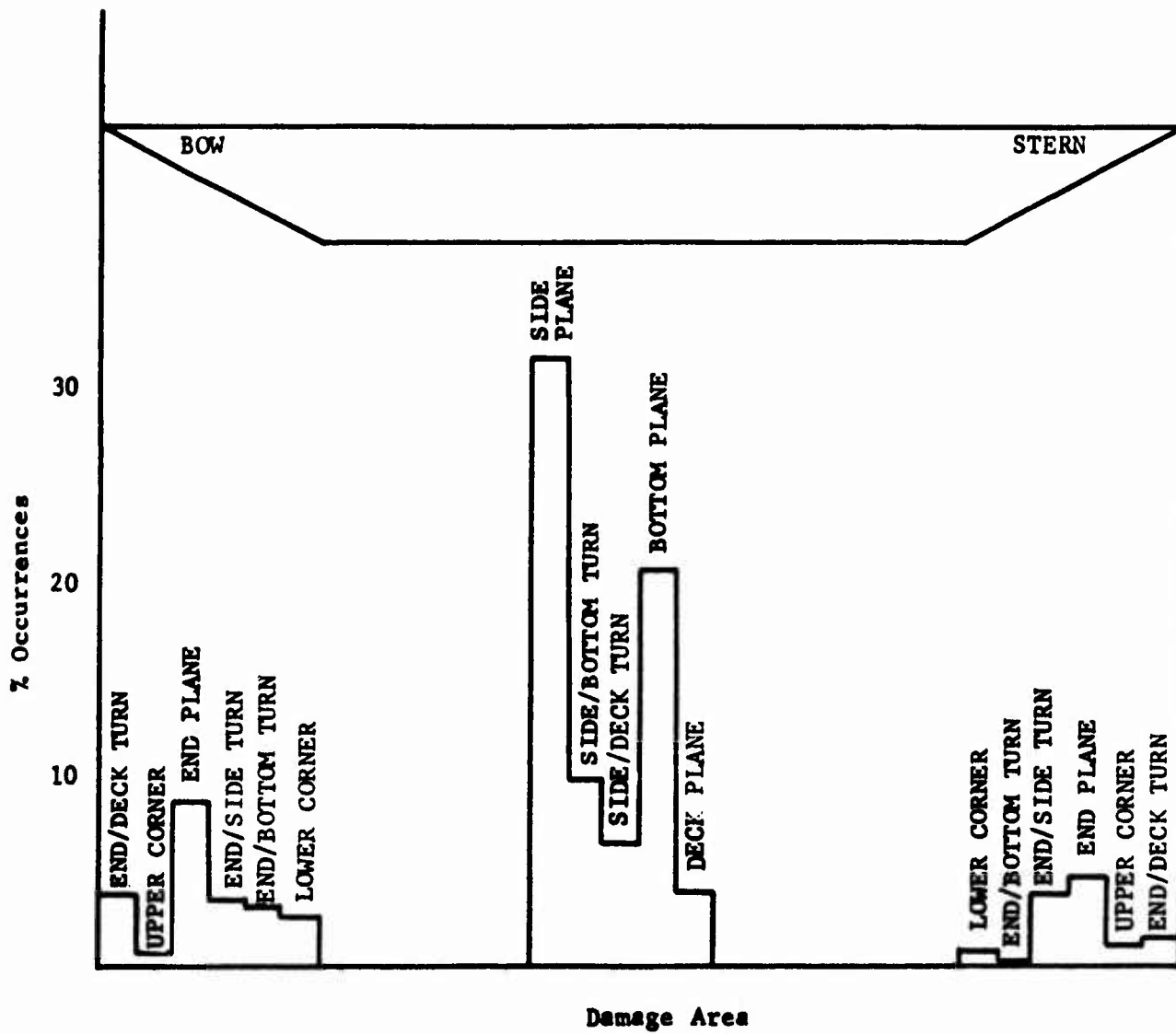


EXHIBIT 5. FREQUENCY OF HULL RUPTURE IN MAJOR BARGE AREAS



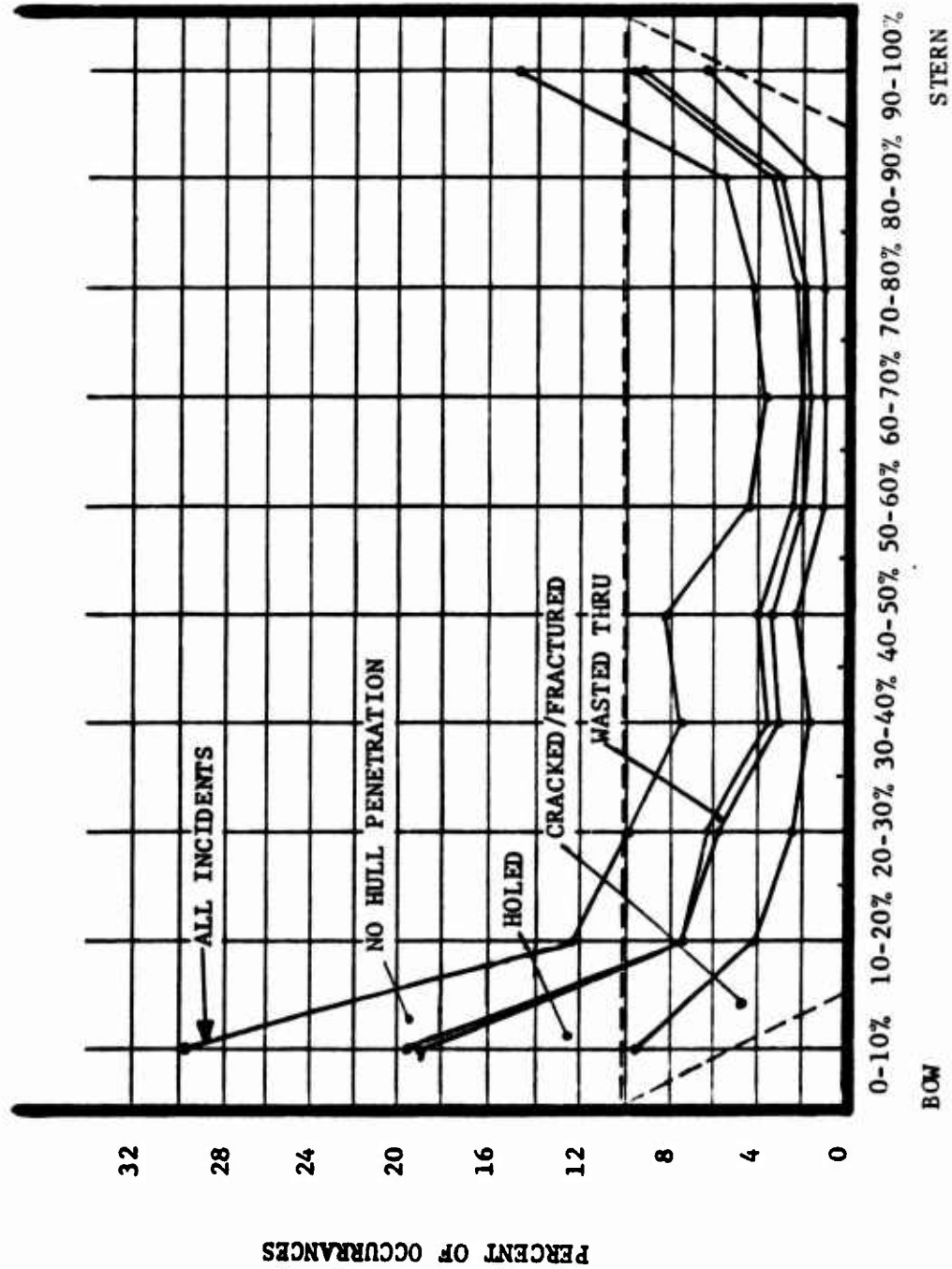


EXHIBIT 6. GRAPH SHOWING DISTRIBUTION OF DAMAGE INCIDENT CENTER LOCATION ALONG BARGE - BY TYPE OF DAMAGE

- Cracks/fractures -  $\approx$  8.7 percent
- Holes -  $\approx$  8.7 percent
- Wasted through. -  $\approx$  0.2 percent
- Dents/Upsets, etc.  $\approx$  12.6 percent
- Total -  $\approx$  30 percent.

This exhibit shows the expected pattern of high incidence near the ends of the barge--with heavy bias toward the bow--diminishing as one approaches the barge mid-section. This pattern holds not only for all damage, but also for each specific type of damage--with the exception of wasted-through hull rupture. This is because this type of damage is most prevalent on the bottom of the barge due to corrosion and erosion. This is not as location oriented as other, more dynamic damage types where frequencies would be expected to increase as the exposure is increased--as, for example, bow and side exposure to dynamic forces of fleeting and locking, as well as collision casualties.

Exhibit 6 also shows the trend of diminished severity of damage on the mid-section as compared to the end portions of the barge. In the bow 10 percent interval, nearly two-thirds of all damages resulted in a hull rupture; whereas, in the mid-section, this ratio drops to approximately one-half. This may also be explainable by the types of damages reported. Wastage and severe distortions become repairable defects prior to becoming hull ruptures--i.e., the damage may be progressive. Dynamic failures, however, do not have this characteristic.

These exhibits show the types of damages and their location--yielding insight into the types of temporary repairs which might be made, where they might occur, and the damage environment in which they must survive. This latter is important to assessing the adequacy of any temporary repair and must, therefore, be considered in defining data needs and test procedures for temporary repair materials.

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#### 4.2 FURTHER DEFINITION OF SIDE-DAMAGE LOCATIONS

Because of the dominance of side damage, this damage mode was investigated further in terms of a longitudinal and vertical matrix showing frequency of various side-damage types.\* Exhibits D-9 through D-12 show the SALTS results of these analyses. Summary data are shown in Exhibits 7 through 9 for hull ruptures, cracks/fractures, and holes, respectively. Wasted-through damage is not displayed because of the low frequency of occurrence on the side plane (four cases).

In Exhibits 7 through 9, the abscissa is again percentage intervals of the barge-side profile. The ordinate, however, is given in feet. While a percentage display might be useful, such was not possible owing to the number of cases in which a barge depth dimension was lacking in the Vessel File. Furthermore, absolute vertical location dimensions may, in fact, be more meaningful because of draft restrictions on most barge routes which tend to make barge depth fairly uniform across the total population.

These exhibits do not display any particular unique damage profile. As might be expected, cracks and fractures (Exhibit 8) seem to cluster near the ends and along the upper portion of the barge. This is reasonable because of the exposure of these areas to the impact forces which produce these failures.

Holes, on the other hand, tend to be more uniform with a cluster tendency at the ends and along the bottom half of the barge. Again, this is reasonable because of striking, submerged, or floating objects which can produce this type of damage.

From the standpoint of temporary repair, however, these differences are of little consequence. It appears that, regardless of the specific damage to be repaired, equal consideration of water chemical and abrasion resistance and hydrostatic pressure resistance must be given because of the incidence of all damages expected below the water line.

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\* It should be mentioned that similar matrix evaluations for other areas, while perhaps desirable, were not possible due to the lack of appropriate data.

VERTICAL DISTANCE INTERVAL - FEET	LENGTH INTERVAL ALONG BARGE -- PERCENT OF LENGTH REFERENCED TO BOW											STERN
	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%		
Over 10.0	3.3	3.4	2.9	1.7	2.9	0.4	1.3	1.3	0.8	2.1		
7.5-10.0	5.5	1.7	2.9	0.8	1.7	0.8	0.4	0.8	2.5	0.8		
5.0-7.5	4.6	1.7	2.5	1.3	0.4	0.8	0.4	0.8	2.1	2.9		
2.6-5.0	6.3	2.5	2.5	0.8	1.7	1.3	0.8	1.3	0.8	2.9		
0-2.5	2.9	2.5	0.8	0.8	0.0	0.4	0.8	0.0	0.8	1.3		

BOW

STERN

LENGTH INTERVAL ALONG BARGE -- PERCENT OF LENGTH REFERENCED TO BOW

# EXHIBIT 7. MATRIX SHOWING DISTRIBUTION OF HULL RUPTURES ON SIDE PLANE

Cells Indicate Percent of Total Incidents of Side  
Hull Ruptures Occurring in Specified Side Zones

VERTICAL DISTANCE INTERVAL - FEET	LENGTH INTERVAL ALONG BARGE--PERCENT OF LENGTH REFERENCED TO BOW											STERN
	0-10%	10-20%	20-30%	30-40%	40-50%	50-60%	60-70%	70-80%	80-90%	90-100%		
Over 10.0	3.8	5.0	2.5	1.9	4.5	0.6	1.9	0.6	0.6	3.1	BOW	
7.5-10.0	3.7	1.3	1.9	1.3	1.9	1.3	0.0	1.3	1.9	1.3		
5.0-7.5	3.8	1.9	1.9	1.3	0.0	1.3	0.0	1.3	2.5	3.1		
2.6-5.0	5.7	1.9	1.9	0.6	0.0	1.3	1.3	1.3	0.0	2.5		
0-2.5	1.9	2.5	1.3	0.6	0.0	0.6	0.6	0.0	0.6	1.0		

LENGTH INTERVAL ALONG BARGE--PERCENT OF LENGTH REFERENCED TO BOW

# EXHIBIT 8 . MATRIX SHOWING DISTRIBUTION OF CRACKS/FRACTURES ON SIDE PLANE

Cells Indicate Percent of Total Incidents of Side  
Cracks/Fractures Occurring in Specified Side Zones

VERTICAL DISTANCE  
INTERVAL - FEET

	Over 10.0	7.5-10.0	5.0-7.5	2.6-5.0	0-2.5
BOW	3.4	3.7	5.7	5.7	4.55
0-10%	0.0	2.3	1.1	3.4	2.3
10-20%	3.4	4.6	3.4	3.4	0.0
20-30%	0.0	0.0	2.3	1.1	1.1
30-40%	2.3	0.0	1.1	2.3	0.0
40-50%	0.0	1.1	1.1	1.1	0.0
50-60%	0.0	1.1	0.0	1.1	1.1
60-70%	1.1	1.1	1.1	1.1	1.1
70-80%	2.3	0.0	0.0	1.1	0.0
80-90%	1.1	3.4	1.1	2.3	2.3
90-100%	1.1	0.0	2.3	5.4	0.0
STERN	1.1	0.0	2.3	0.0	0.0

BOW

LENGTH INTERVAL ALONG BARGE--PERCENT OF LENGTH REFERENCED TO BOW

# EXHIBIT 9. MATRIX SHOWING DISTRIBUTION OF HOLES ON SIDE PLANE

Cells Indicate Percent of Total Incidents of  
Side Holes Occurring in Specified Side Zones


(17)  
(31)

### 4.3 HULL-RUPTURE EXTENT

Another significant damage profile parameter required for the development of test procedures for temporary repair materials is the extent of the hull rupture--or size of the hole over which the temporary repair must maintain water-tight integrity and, perhaps, provide for structural continuity. Therefore, hull ruptures were examined to determine their size characteristics. Crack lengths were taken to be the diagonal of a rectangle containing the crack. Holed damage and wasted-through damage were taken to be the area of the rectangle containing the rupture.

Exhibits D-13, D-14, and D-15 are the SALTS results of these analyses. Exhibit 10 summarizes the results of the crack length investigation. As can be seen, approximately one-third of all cracks are less than one-foot long. However, this is on the low side--owing to the large number of cracks for which appropriate dimensions were not supplied in the survey reports. If it is assumed that the "unknown" category is distributed proportionately over the known length intervals, the percentage of cracks under one foot in length is over 50 percent. This length is highlighted because it would appear that if the cost and complexity of test requirements for temporary repairs to cracks is highly sensitive to the length of the crack, it would be reasonable to concentrate on the small ones. Contacts with barge industry representatives have also indicated that these are likely candidates for temporary repair. Larger cracks will generally be the result of more extensive damage which requires permanent repairs.

Exhibit 11 summarizes the results of the investigation of the area of holed and wasted-through damage. Again, the dominance is at the small end--under one square foot. While there is a clustering of data at the larger end, these must be largely discounted because they generally occurred in the presence of more massive damage--not all of which was rupture area. For example, a damage might have been termed "dented and holed" with the damage dimensions given in the survey reports applicable to the entire distorted area--not the extent of the rupture itself. Therefore, while the precise values cannot be determined, it is reasonable to assume that the



**EXHIBIT 10. CRACK LENGTH--FREQUENCY OF OCCURRENCE  
BY SPECIFIED LENGTH INTERVALS**

<u>Crack Length, feet</u>	<u>Percent of Crack Occurrences</u>
Under 1	31.44
1-3	11.01
3-6	6.43
6-10	3.91
Over 10	9.63
Unknown	37.87

**EXHIBIT 11. DAMAGE AREA--FREQUENCY OF OCCURRENCE OF DAMAGE  
TYPES IN SPECIFIED AREA INTERVALS**

<u>Area, ft<sup>2</sup></u>	<u>Percent of Occurrences</u>	
	<u>Holed</u>	<u>Wasted Through</u>
Under 1	28.24	22.73
1-2	2.89	--
2-3	2.31	--
3-5	4.60	9.10
5-10	8.92	4.55
10-100	22.47	45.47
Over 100 + unknown	29.70	18.20

21  
8/3

proportion of actual hull rupture of less than one square foot area is considerably greater than depicted in Exhibit 11.

Therefore, concentration on the small area openings should receive highest priority should compromises on the scope of the temporary repair material tests be required.

22  
24

**APPENDIX A**

**TANK BARGE DAMAGE CODE SHEET**  
**AND EXPLANATIONS**

(22) 24X  
2



# TANK BARGE DAMAGE SURVEY DATA FORM - CODING EXPLANATION/RULES

TBDSDF Ques. No.	TBDSDF Question		Corresponding Inspection		Explanation
	General	Detail	No.	Question	
1	Vessel ID		N/A	Official Number	<ul style="list-style-type: none"> <li>• Code in CC1-2 either DN (document number) or CC (Coast Guard)</li> <li>• Code in 3-8 official number - always 6 digits</li> </ul>
2	Case Incident		1 3	profile diagram location of damage	<ul style="list-style-type: none"> <li>• determine individual damages for one barge (within the same sequence no) and number incident sequentially starting with 01 in CC 9-10</li> <li>• always zero fill if number is less than 10</li> </ul>
3	Damage Type		2	Type of Damage	<ul style="list-style-type: none"> <li>• in cc 11-12 left justified code types of damage from general to specific.</li> <li>• if only one type leave CC 12 blank and all of question 7 blank</li> <li>• Code the following letters for inspection report answers H-holed, punctured, pinhole C-cracked, fracture, hairline D-deformed, indented, dented, upset (plate), set in (plate), distorted W-general wastage, wasted, wear and tear that does not penetrate barrier T-wastage that penetrated through barrier U-if question is not answered, or answered improperly</li> </ul>
4	Damage Area	Face only	1 3	profile diagram location of damage	<ul style="list-style-type: none"> <li>• answer in CC 13 only if damage is limited to one surface</li> <li>• respond with S(side), B(bottom), D(deck), E(end), R(rake), N(stern-tug notch), I(internal bulkhead, walls of cargo tanks)</li> </ul>
		Knuckle Corner	1 3	profile diagram location of damage	<ul style="list-style-type: none"> <li>• answer in CC 14-16 if damage covers more than one surface.</li> <li>• respond with combination of 2 or 3 of above surface codes</li> </ul>

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**TANK BARGE DAMAGE SURVEY DATA FORM - CODING EXPLANATION/RULES (Continued)**

TBDSDF Ques. No.	TBDSDF Question		Corresponding Inspection		Explanation
	General	Detail	No.	Question	
5	Damage center location		1	profile section	respond in CC 17 S(stern), B(Bow) or U(unknown)
6					<ul style="list-style-type: none"> <li>question 6 is to be coded only for the type of damage coded in CC 11 (i.e., the first type of damage) (question 7 is for second type)*</li> <li>when coding fields in tenths of feet use the following rules: code inches (converted to tenths of feet) in the right most column of the field code feet in the 3 left most columns (if 4 column field) or 2 left most (if 3 column field) code all 9's if field is unknown code all 9's with last digit 8 for all values the exceed field limit leave blank if not applicable (i.e., if deck damaged code only longitudinal and transverse; if side code longitudinal and vertical; if knuckle only one of the three (longitudinal, transverse or vertical) are coded; if end damaged code vertical and transverse) all 3 fields must be coded for rake damage*</li> <li>Blank fill, right adjust fields*</li> <li>if a damage location area is answered the corresponding damage extent must be answered*</li> </ul>
	first damage location	longitudinal from end	3a	longitudinally	code in CC 18-21 in tenths of feet the distance of damage from nearest end
		vertical from bottom	3b	vertical	code in CC 22-24 in tenths of feet the distance of damage from the bottom
		transverse from center	1	cross section	code in CC 25-27 in tenths of feet the distance of damage from the center line (separation port starboard)
	first damage extent	longitudinal	3c	longitudinal	code in 28-31 in tenths of feet the longitudinal extent (area covered) of damage
		vertical	3d	vertical extent	code 32-34 in tenths of feet the vertical extent of damage
		transverse	3e	transverse extent	code in 35-37 in tenths of feet the transverse extent of damage.

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**TANK BARGE DAMAGE SURVEY DATA FORM - CODING EXPLANATION/RULES (Continued)**

TBDSDF Ques. No.	TBDSDF Question		Corresponding Inspection		Explanation
	General	Detail	No.	Question	
7					<ul style="list-style-type: none"> <li>question 7 is answered only if an answer was coded for secondary type of damage (i.e., CC 12)</li> <li>*See general coding explanation -question 6</li> <li>coding rules for individual section in question 7 are the same as corresponding section in question 6.</li> </ul>
	second damage -location	longitudinal from end	3a	longitudinally	code in CC 38-71
		vertical from bottom	3b	vertical	code in CC 42-44
		transverse from center	1	cross section	code in CC 45-47
	first damage -extent	longitudinal	3c	longitudinal	code in CC 48-51
8	Double Barrier	vertical	3d	vertical extent	code in CC 52-54
		transverse	3e	transverse extent	code in CC 55-57
		side	4	single/double sided	in CC 58 code Y(Yes) if double sided, N(No) if single side, U(Unknown) if unknown
		bottom	5	single/double bottom	in CC 59 code Y(Yes) if double bottomed, N(No) if single bottom, U(Unknown) if unknown
		end	6	tank contain cargo profile section	if response to inspection question 6 is "end void" then code in CC 60 Y(Yes) for double rake or end, N(No) for single rake or end U(Unknown) if cannot tell.
9	Tank Penetrated	side	4a	penetrate side	in CC 61 code Y(Yes) if penetrated, N(No) if not penetrated but threatened, U(Unknown) if left blank, X(N/A) if not penetrated and not threatened
		bottom	5a	penetrate bottom	in CC 62 code Y, N, U, or X (same as for penetrated side)
		end	6	tank contain cargo profile section	if response to inspection question 6 is penetrated and void code in CC 63 Y(Yes), if cannot tell code U(Unknown).

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**TANK BARGE DAMAGE SURVEY DATA FORM - CODING EXPLANATION/RULES (Continued)**

TBDSDF ques. no.	TBDSDF Question		Corresponding Inspection		Explanation
	General	Detail	No.	Question	
10	Double Barrier Prevent Penetration	side	4b	prevent side penetration	<ul style="list-style-type: none"> <li>• respond to this only if CC 58 was coded N(No)</li> <li>• in CC 64 respond Y(Yes), N(No but threatened) P(possibly, maybe), U(Unknown), X(No-not threatened)</li> </ul>
		bottom	5c	prevent bottom penetration	<ul style="list-style-type: none"> <li>• respond to this only if CC 59 was coded N(No)</li> <li>• in CC 65 respond Y, N, P, U, or X (same as for prevent side penetration)</li> </ul>
		end	6	tank contain cargo profile section	<ul style="list-style-type: none"> <li>• respond to this only if CC 60 was coded N(No)</li> <li>• in CC 66 respond Y, N, P, U, or X (same as for prevent side penetration)</li> </ul>
		all	4b 5b	prevent side prevent bottom	<ul style="list-style-type: none"> <li>• respond to this only if CC 58 and 59 were coded N(No) and damage was to a side bottom knuckle area (CC 14-16 were code S,B)</li> </ul>
			6(second part)	tank carry cargo when damage	<ul style="list-style-type: none"> <li>• in CC 67 code Y(Yes), N(No), U(Unknown), X (not applicable)</li> </ul>
11	Tank Loaded When Damaged				
12	Cause of Damage		7	cause of damage	<ul style="list-style-type: none"> <li>• in CC 68 code the following letters for in- spection report answers C-Collision R-Ramming, hitting nonsubmerged stationary object (locks, docks, etc) G-Grounding H-Hit submerged objects (rocks, etc.) F-Structural failure (bad welds and/or re- pairs) A-Cargo Action (shift in tanks causing damage) S-In service, deterioration, wear and tear, tug action, rough service O-Other miscellaneous causes U-Unknown</li> </ul>

**TANK BARGE DAMAGE SURVEY DATA FORM - CODING EXPLANATION/RULES (Continued)**

TBDSDF Ques. No.	TBDSDF Question		Corresponding Inspection		Explanation
	General	Detail	No.	Question	
13	Cost of Repairs		8 (first part)	cost of repairs	<ul style="list-style-type: none"> <li>• respond in tens of dollars (round off to nearest tens)</li> <li>• if greater than \$100,000 code 9998</li> <li>• if unknown code 9999</li> <li>• if multiple incidents occur and cost is for total repair code amount in incident 01 and leave all subsequent incident cost blank</li> <li>• code answer in CC 70-73 right adjusted, blank filled</li> </ul>
14	Weight of repair materials		8 (second part)	weight of repair materials	<p align="center">A-6</p> <ul style="list-style-type: none"> <li>• respond in tens of pounds (round off to nearest tens)</li> <li>• if greater than 100,000 pounds code 9998</li> <li>• if unknown code 9999</li> <li>• if multiple incident occur and pounds is for total repair code weight in incident 01 and leave all subsequent incident weights blank</li> <li>• code answer in CC 74-77 right justified, blank filled</li> </ul>
15	Sequence number		N/A	hand written in upper corner	<ul style="list-style-type: none"> <li>• code in CC 78-80 3 digit sequence number (which range from 100 to 850)</li> </ul>

95%

**APPENDIX B**

**TANK BARGE SALTS DATA RECORD LAYOUT**

31  
32  
33  
34

TANK BARGE DAMAGE SURVEY RECORD FORMAT

SALTS FIELD		SALTS RECORD		ORIGAN		SALTS FIELD		SALTS RECORD		ORIGAN	
No.	Wld	Position	Description	CRD (COL)	Wld	No.	Wld	Position	Description	CRD (COL)	Wld
1	2	1-2	Vessel ID Type	1(1-2)	2	40	2	113-114	Design Speed	3(27-28)	2
2	2	3-4	Vessel ID	1(3-8)	6	41	2	115-116	Type Propulsion	3(29-30)	2
3	4	5-8				42	1	117	Number of Boilers	3(31)	1
4	4	9-12	Sort Field	1(9-17)	9	43	1	118	Type Wheel	3(32)	1
5	1	13				44	1	119	Number of Shafts	3(33)	1
6	4	14-17				45	1	120	Stern Bearing/Kort Nozzel	3(34)	1
7	4	18-21	Vessel Name	1(18-49)	32	46	1	121	Position/Thruster	3(35)	1
8	4	22-25				47	1	122	Skeg/Flanking	3(36)	1
9	4	26-29				48	1	123	Bridge	3(37)	1
10	4	30-33				49	1	124	E/R Automation	3(38)	1
11	4	34-37				50	1	125	Auto Tension	3(39)	1
12	4	38-41				51	1	126	Gaging	3(40)	1
13	4	42-45				52	1	127	Vents	3(41)	1
14	4	46-49				53	1	128	Number of Pumps	3(42)	1
15	4	50-53				54	3	129-131	Capacity	3(48-54)	7
16	4	54-57	Place Built-City/County	2(2-15)	14	55	4	132-135			
17	4	58-61				56	1	136	Units	3(55)	1
18	2	62-63				57	1	137	Highest Grade	3(56)	1
19	2	64-65	Place Built-ST/For	2(16-17)	2	58	1	138	Highest Grade	3(57)	1
20	4	66-69	Year Built	2(18-21)	4	59	1	139	Rake Grade	3(58)	1
21	3	70-72	Vessel Class (Type)	2(22-24)	3	60	1	140	Deck Tank	3(59)	1
22	4	73-76	Vessel Class	2(25-28)	4	61	1	141	Number Tanks Across	3(60)	1
23	1	77	Subchapter	2(29)	1	62	2	142-143	Number Tanks Lengthwise	3(61-62)	2
24	1	78	Barge Hull	2(30)	1	63	1	144	Integral/Independent	3(63)	1
25	1	79	Registered Length	2(46-50)	5	64	1	145	Elevated Pressure	3(64)	1
26	4	80-83				65	1	146	Temperature	3(65)	1
27	4	84-87	Breadth (MLD)	2(51-54)	4	66	1	147	Insulated	3(66)	1
28	4	88-91	Registered Breadth	2(55-58)	4	67	1	148	Boiler/Ref.	3(67)	1
29	3	92-94	Depth (MLD)	2(59-61)	3	68	2	149-150	Number of Holds	3(68-69)	2
30	3	95-97	Draft Design	2(62-64)	3	69	1	151	Desk Openings	3(70)	1
31	3	98-100	Registered Depth	2(65-67)	3	70	4	152-155	Owner	4(7-31)	25
32	2	101-102	Gross	3(3-8)	6	71	4	156-159			
33	4	103-106				72	4	160-163			
34	1	107	Hull Material	3(21)	1	73	4	164-167			
35	1	108	Special Material	3(22)	1	74	4	168-171			
36	1	109	Fore Body	3(23)	1	75	4	172-175			
37	1	110	Ice Strengthened	3(24)	1	76	1	176			
38	1	111	Double Sides	3(25)	1	77	4	177-180	Operator	4(32-56)	25
39	1	112	Double Bottom	3(26)	1	78	4	181-184			

# TANK BARGE DAMAGE SURVEY RECORD FORMAT

TS FIELD		SALTS RECORD		ORIGAN		SALTS FIELD		SALTS RECORD		ORIGAN	
No.	Wid	Position	Description	CRD (COL)	Wid	No.	Wid	Position	Description	CRD (COL)	Wid
79	4	185-188	Operator-Street Address	4(57-76)	20	118	1	285	Damage Area-Face	6(13)	1
80	4	189-192				119	3	286-288	Damage Area-Knuckle	6(14-16)	3
81	4	193-196				120	1	289	Damage Location	6(17)	1
82	4	197-200				121	4	290-293	1st Longitudinal Location	6(18-21)	4
83	1	201	Operator City	4(77-80)	14	122	3	294-296	1st Vertical Location	6(22-24)	3
84	4	202-205				123	3	297-299	1st Transverse Location	6(25-27)	3
85	4	206-209				124	4	300-303	1st Rearward Location	[created]	4
86	4	210-213				125	4	304-307	1st Longitudinal Extent	6(28-31)	4
87	4	214-217	Operator State	5(1-10)		126	3	308-310	1st Vertical Extent	6(32-34)	3
88	4	218-221				127	3	311-313	1st Transverse Extent	6(35-37)	3
89	4	222-225				128	4	314-317	Individual Damage Area	[created]	8
90	4	226-229				129	4	318-321	Total Damage Area	[created]	8
91	4	230-233	Operator State	5(11-12)	2	130	4	322-325			
92	2	234-235				131	4	326-329	Crack Length	[created]	4
93	2	236-237				132	4	330-333			
94	4	238-241				133	4	334-337	2nd Longitudinal Location	6(48-41)	4
95	1	242	Operator Zip	5(13-17)	5	134	3	338-340	2nd Vertical Location	6(42-44)	3
96	2	243-244				135	3	341-343	2nd Transverse Location	6(45-47)	3
97	2	245-246				136	4	344-347	2nd Longitudinal Extent	6(78-51)	4
98	2	247-248				137	3	348-350	2nd Vertical Extent	6(52-54)	3
99	3	249-251	Inspection Due Year	5(24-26)	3	138	3	351-353	2nd Transverse Extent	6(55-57)	3
100	2	252-253				139	1	354	Double Barrier Side	6(58)	1
101	2	254-255				140	1	355	Double Barrier Bottom	6(59)	1
102	2	256-257				141	1	356	Double Barrier End	6(60)	1
103	2	258-259	Last Dry Dock Year	5(31-32)	2	142	1	357	Tank Penetrated Side	6(61)	1
104	2	260-261				143	1	358	Tank Penetrated Bottom	6(62)	1
105	3	262-264				144	1	359	Tank Penetrated End	6(63)	1
106	2	265-266				145	1	360	Double Prevent Pen. Side	6(64)	1
107	2	267-268	Date Last Update Month	5(72-73)	2	146	1	361	Double Prevent Pen. Bottom	6(65)	1
108	1	269				147	1	362	Double Prevent Pen. End	6(66)	1
109	2	270-271				148	1	363	Double Prevent Pen. All	6(67)	1
110	1	272				149	1	364	Tank Loaded When damage	6(68)	1
111	2	273-274	Status	5(78-79)	2	150	1	365	Cause of Damage	6(69)	1
112	1	275				151	4	366-369	Individual Cost	6(70-73)	4
113	2	276-277				152	4	370-373	Total Cost	[created]	4
114	2	278-279				153	4	374-377	Individual Weight	6(74-77)	4
115	3	280-282	Sequence Number	6(78-80)	3	154	4	378-381	Total Weight	[created]	4
116	1	283				155	4	382-385	1st Rearward Locat. %	[created]	4
117	1	284				156	4	386-389	1st Longitudinal Locat. %	[created]	4

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APPENDIX C

SALTS ANALYSIS EVENT DEFINITIONS

SALTS 2.10 SESSION: 11/04/74 09:56:24

PASSWORD? RDL

/RESIDENT

/♦POOL

POOL FILE NAME? TBP1

THE FOLLOWING FILES ARE CORE RESIDENT

POOL FILE : TBP1

DATA BASE FILE : TKBG

/♦EXIT

/DISPLAY

/♦EVENTS

POOL NAME : TBP1

POOL DATA BASE : TKBG

POOL LEGEND : TANK BARGE POOL

MAXIMUM NUMBER OF EVENTS : 97

POOL UPDATE : 13

\*\*\*\*\*  
EVENT NAME? ALL

EVENT NAME : RUP

EVENT LEGEND : HULL-RUPTURED

NUM. FIELDS : 1

FIELD 1 : 155

NUM. CONDS. : 1 INCL

CONDITION 1 : Y, Y.

\*\*\*\*\*  
EVENT NAME : NRUP

EVENT LEGEND : HULL-NOT-RUPTURED

NUM. FIELDS : 1

FIELD 1 : 155

NUM. CONDS. : 1 INCL

CONDITION 1 : N, N.

\*\*\*\*\*  
EVENT NAME : PAS

EVENT LEGEND : DAMAG-PLANE-SIDE

NUM. FIELDS : 2

FIELD 1 : 118

NUM. CONDS. : 1 INCL

CONDITION 1 : S,S.

FIELD 2 : 119

NUM. CONDS. : 2 INCL

CONDITION 1 : RS ,RS .

CONDITION 2 : SR ,SR .

\*\*\*\*\*

(37)  
(19)

C-2

EVENT NAME : PAE  
EVENT LEGEND : DAMAG-PLANE-END  
NUM. FIELDS : 2

FIELD 1 : 118  
NUM. CONDS. : 1 INCL  
CONDITION 1 : E.E.

FIELD 2 : 119  
NUM. CONDS. : 2 INCL  
CONDITION 1 : PE ,RE .  
CONDITION 2 : ER ,ER .

\*\*\*\*\*  
EVENT NAME : PAB  
EVENT LEGEND : DAMAG-PLANE-BOTTOM  
NUM. FIELDS : 1

FIELD 1 : 118  
NUM. CONDS. : 1 INCL  
CONDITION 1 : B.B.

\*\*\*\*\*  
EVENT NAME : PAD  
EVENT LEGEND : DAMAG-PLANE-DECK  
NUM. FIELDS : 1


FIELD 1 : 118  
NUM. CONDS. : 1 INCL  
CONDITION 1 : D.D.

\*\*\*\*\*  
EVENT NAME : KSD  
EVENT LEGEND : DAMAG-KNUCKL-SIDDECK  
NUM. FIELDS : 1

FIELD 1 : 119  
NUM. CONDS. : 5 INCL  
CONDITION 1 : SD ,SD .  
CONDITION 2 : DS ,DS .  
CONDITION 3 : RDS ,RDS .  
CONDITION 4 : RSD ,RSD .  
CONDITION 5 : DSR ,DSR .

\*\*\*\*\*  
EVENT NAME : KSB  
EVENT LEGEND : DAMAG-KNUCKL-SIDEBOT  
NUM. FIELDS : 1

FIELD 1 : 119  
NUM. CONDS. : 2 INCL  
CONDITION 1 : SB ,SB .  
CONDITION 2 : BS ,BS .  
\*\*\*\*\*



EVENT NAME : KED  
 EVENT LEGEND : DAMAG-KNUCKL-ENDDECK  
 NUM. FIELDS : 1

FIELD 1 : 119  
 NUM. CONDS. : 6 INCL  
 CONDITION 1 : DE ,DE .  
 CONDITION 2 : ED ,ED .  
 CONDITION 3 : RD ,RD .  
 CONDITION 4 : DRE,DRE.  
 CONDITION 5 : RDE,RDE.  
 CONDITION 6 : PED,PED.

\*\*\*\*\*  
 EVENT NAME : KES  
 EVENT LEGEND : DAMAG-KNUCKL-ENDSIDE  
 NUM. FIELDS : 1

FIELD 1 : 119  
 NUM. CONDS. : 6 INCL  
 CONDITION 1 : SE ,SE .  
 CONDITION 2 : ES ,ES .  
 CONDITION 3 : RES,RES.  
 CONDITION 4 : RSE,RSE.  
 CONDITION 5 : SRE,SRE.  
 CONDITION 6 : SER,SER.

\*\*\*\*\*  
 EVENT NAME : KEB  
 EVENT LEGEND : DAMAG-KNUCKL-ENDBOTT  
 NUM. FIELDS : 1

FIELD 1 : 119  
 NUM. CONDS. : 8 INCL  
 CONDITION 1 : BE ,BE .  
 CONDITION 2 : EB ,EB .  
 CONDITION 3 : RB ,RB .  
 CONDITION 4 : BR ,BR .  
 CONDITION 5 : RBE,RBE.  
 CONDITION 6 : REB,REB.  
 CONDITION 7 : ERB,ERB.  
 CONDITION 8 : BRE,BRE.

\*\*\*\*\*  
 EVENT NAME : UPC  
 EVENT LEGEND : DAMAG-KNUCKL-UPCORN  
 NUM. FIELDS : 1

FIELD 1 : 119  
 NUM. CONDS. : 4 INCL  
 CONDITION 1 : EDS,EDS.  
 CONDITION 2 : DSE,DSE.  
 CONDITION 3 : ESD,ESD.  
 CONDITION 4 : SED,SED.

\*\*\*\*\*

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EVENT NAME : LWC  
 EVENT LEGEND : DAMAG-KNUCKL-LWCORNR  
 NUM. FIELDS : 1

FIELD 1 : 119  
 NUM. CONDS. : 8 INCL  
 CONDITION 1 : EBS,EBS.  
 CONDITION 2 : ESS,ESB.  
 CONDITION 3 : BSE,BSE.  
 CONDITION 4 : PSB,PSB.  
 CONDITION 5 : BRS,BRS.  
 CONDITION 6 : BSP,BSP.  
 CONDITION 7 : RBS,RBS.  
 CONDITION 8 : SRB,SPB.

\*\*\*\*\*  
 EVENT NAME : COM  
 EVENT LEGEND : DAMAG-COMPOUND  
 NUM. FIELDS : 1

FIELD 1 : 119  
 NUM. CONDS. : 4 INCL  
 CONDITION 1 : DSB,DSB.  
 CONDITION 2 : BSD,BSD.  
 CONDITION 3 : SDB,SDB.  
 CONDITION 4 : SBS,SBS.

\*\*\*\*\*  
 EVENT NAME : DS  
 EVENT LEGEND : DOUBL-BARRIER-SIDE  
 NUM. FIELDS : 1

FIELD 1 : 139  
 NUM. CONDS. : 1 INCL  
 CONDITION 1 : Y,Y.

\*\*\*\*\*  
 EVENT NAME : DB  
 EVENT LEGEND : DOUBL-BARRIER-BOTTOM  
 NUM. FIELDS : 1

FIELD 1 : 140  
 NUM. CONDS. : 1 INCL  
 CONDITION 1 : Y,Y.

\*\*\*\*\*  
 EVENT NAME : DE  
 EVENT LEGEND : DOUBL-BARRIER-END  
 NUM. FIELDS : 1

FIELD 1 : 141  
 NUM. CONDS. : 1 INCL  
 CONDITION 1 : Y,Y.

\*\*\*\*\*

EVENT NAME : SS  
EVENT LEGEND : SINGL-BARRIER-SIDE  
NUM. FIELDS : 1

FIELD 1 : 139  
NUM. CONDS. : 1 INCL  
CONDITION 1 : N,N.

\*\*\*\*\*  
EVENT NAME : SB  
EVENT LEGEND : SINGL-BARRIER-BOTTOM  
NUM. FIELDS : 1

FIELD 1 : 140  
NUM. CONDS. : 1 INCL  
CONDITION 1 : N,N.

\*\*\*\*\*  
EVENT NAME : SE  
EVENT LEGEND : SINGL-BARRIER-END  
NUM. FIELDS : 1

FIELD 1 : 141  
NUM. CONDS. : 1 INCL  
CONDITION 1 : N,N.

\*\*\*\*\*  
EVENT NAME : UE  
EVENT LEGEND : UNKNOWN-BARRIER-END  
NUM. FIELDS : 1

FIELD 1 : 141  
NUM. CONDS. : 1 INCL  
CONDITION 1 : U,U.

\*\*\*\*\*  
EVENT NAME : SP  
EVENT LEGEND : SIDE-PENTRATION  
NUM. FIELDS : 1

FIELD 1 : 142  
NUM. CONDS. : 1 INCL  
CONDITION 1 : Y,Y.

\*\*\*\*\*  
EVENT NAME : BP  
EVENT LEGEND : BOTTOM-PENTRATION  
NUM. FIELDS : 1

FIELD 1 : 143  
NUM. CONDS. : 1 INCL  
CONDITION 1 : Y,Y.

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C-6

EVENT NAME : EP  
EVENT LEGEND : END-PENTRATION  
NUM. FIELDS : 1

FIELD 1 : 144  
NUM. CONDS. : 1 INCL  
CONDITION 1 : Y,Y.

\*\*\*\*\*  
EVENT NAME : EV  
EVENT LEGEND : END-VOID-AREA  
NUM. FIELDS : 1

FIELD 1 : 142  
NUM. CONDS. : 1 EXCL  
CONDITION 1 : Y,Y.

\*\*\*\*\*  
EVENT NAME : NSP  
EVENT LEGEND : NO-SIDE-PENTRATION  
NUM. FIELDS : 1

FIELD 1 : 142  
NUM. CONDS. : 2 INCL  
CONDITION 1 : N,N.  
CONDITION 2 : X,X.

\*\*\*\*\*  
EVENT NAME : PDS  
EVENT LEGEND : DOUBL-SIDE-PREVENT  
NUM. FIELDS : 1

FIELD 1 : 145  
NUM. CONDS. : 2 INCL  
CONDITION 1 : Y,Y.  
CONDITION 2 : P,P.

\*\*\*\*\*  
EVENT NAME : PDB  
EVENT LEGEND : DOUBL-BOTTOM-PREVENT  
NUM. FIELDS : 1

FIELD 1 : 146  
NUM. CONDS. : 2 INCL  
CONDITION 1 : Y,Y.  
CONDITION 2 : P,P.

\*\*\*\*\*

(42)

C-7

EVENT NAME : PDE  
EVENT LEGEND : DOUBL-END-PREVENT  
NUM. FIELDS : 1

FIELD 1 : 147  
NUM. CONDS. : 2 INCL  
CONDITION 1 : Y,Y.  
CONDITION 2 : P,P.

\*\*\*\*\*  
EVENT NAME : PSB  
EVENT LEGEND : DOUBL-SIDE/BOTT-PREV  
NUM. FIELDS : 1

FIELD 1 : 148  
NUM. CONDS. : 2 INCL  
CONDITION 1 : Y,Y.  
CONDITION 2 : P,P.

\*\*\*\*\*  
EVENT NAME : TP  
EVENT LEGEND : TANK-PENETRATION-GEN  
NUM. FIELDS : 3

FIELD 1 : 142  
NUM. CONDS. : 1 INCL  
CONDITION 1 : Y,Y.

FIELD 2 : 143  
NUM. CONDS. : 1 INCL  
CONDITION 1 : Y,Y.

FIELD 3 : 144  
NUM. CONDS. : 1 INCL  
CONDITION 1 : Y,Y.

\*\*\*\*\*  
EVENT NAME : LAKE  
EVENT LEGEND : RT-LAKES-BAYS-SOUNDS  
NUM. FIELDS : 1

FIELD 1 : 106  
NUM. CONDS. : 1 INCL  
CONDITION 1 : L ,L .

\*\*\*\*\*  
EVENT NAME : COAS  
EVENT LEGEND : RT-COASTWISE  
NUM. FIELDS : 1

FIELD 1 : 106  
NUM. CONDS. : 1 INCL  
CONDITION 1 : C ,C .

(43)

C-8

EVENT NAME : OCEN  
EVENT LEGEND : PT-OCEANS  
NUM. FIELDS : 1

FIELD 1 : 106  
NUM. CONDS. : 1 INCL  
CONDITION 1 : O.O.

\*\*\*\*\*  
EVENT NAME : RIVR  
EVENT LEGEND : RT-RIVERS  
NUM. FIELDS : 1

FIELD 1 : 106  
NUM. CONDS. : 1 INCL  
CONDITION 1 : R.R.

\*\*\*\*\*  
EVENT NAME : GLAK  
EVENT LEGEND : RT-GREAT-LAKES  
NUM. FIELDS : 1

FIELD 1 : 106  
NUM. CONDS. : 1 INCL  
CONDITION 1 : G.G.

\*\*\*\*\*  
EVENT NAME : CRAK  
EVENT LEGEND : DAMAG-CRACK  
NUM. FIELDS : 2

FIELD 1 : 116  
NUM. CONDS. : 1 INCL  
CONDITION 1 : C.C.

FIELD 2 : 117  
NUM. CONDS. : 1 INCL  
CONDITION 1 : C.C.

\*\*\*\*\*  
EVENT NAME : HOLE  
EVENT LEGEND : DAMAG-HOLED  
NUM. FIELDS : 2

FIELD 1 : 116  
NUM. CONDS. : 1 INCL  
CONDITION 1 : H.H.

FIELD 2 : 117  
NUM. CONDS. : 1 INCL  
CONDITION 1 : H.H.

\*\*\*\*\*

46

C-9

EVENT NAME : WHOL  
EVENT LEGEND : DAMAG-WASTED-THROUGH  
NUM. FIELDS : 1

FIELD 1 : 116  
NUM. CONDS. : 1 INCL  
CONDITION 1 : T,T.

\*\*\*\*\*  
EVENT NAME : DENT  
EVENT LEGEND : DAMAG-DENTED,UPSET  
NUM. FIELDS : 1

FIELD 1 : 116  
NUM. CONDS. : 1 INCL  
CONDITION 1 : D,D.

\*\*\*\*\*  
EVENT NAME : WAST  
EVENT LEGEND : DAMAG-WASTED  
NUM. FIELDS : 1

FIELD 1 : 116  
NUM. CONDS. : 1 INCL  
CONDITION 1 : W,W.

\*\*\*\*\*  
EVENT NAME : R25  
EVENT LEGEND : REAR-REACH=LT-25-FT  
NUM. FIELDS : 1

FIELD 1 : 124  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0000,0250.

\*\*\*\*\*  
EVENT NAME : R50  
EVENT LEGEND : REAR-REACH=25-50-FT  
NUM. FIELDS : 1

FIELD 1 : 124  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0251,0500.

\*\*\*\*\*  
EVENT NAME : R75  
EVENT LEGEND : REAR-REACH=50-75-FT  
NUM. FIELDS : 1

FIELD 1 : 124  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0501,0750.

\*\*\*\*\*

45

C-10

EVENT NAME : R100  
EVENT LEGEND : REAR-REACH=75-100-FT  
NUM. FIELDS : 1

FIELD 1 : 124  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0751,1000.

\*\*\*\*\*  
EVENT NAME : R500  
EVENT LEGEND : REAR-REACH=5T-100-FT  
NUM. FIELDS : 1

FIELD 1 : 124  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 1001,5000.

\*\*\*\*\*  
EVENT NAME : BOW  
EVENT LEGEND : DAMAGE-FROM-BOW  
NUM. FIELDS : 1

FIELD 1 : 120  
NUM. CONDS. : 1 EXCL  
CONDITION 1 : S.S.

\*\*\*\*\*  
EVENT NAME : STER  
EVENT LEGEND : DAMAGE-FROM-STERN  
NUM. FIELDS : 1

FIELD 1 : 120  
NUM. CONDS. : 1 INCL  
CONDITION 1 : S.S.

\*\*\*\*\*  
EVENT NAME : C25  
EVENT LEGEND : CENTER=LT-25-FT  
NUM. FIELDS : 1

FIELD 1 : 121  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0000,0250.

\*\*\*\*\*  
EVENT NAME : C50  
EVENT LEGEND : CENTER=25-50-FT  
NUM. FIELDS : 1

FIELD 1 : 121  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0251,0500.

\*\*\*\*\*

46  
46

C-11

EVENT NAME : C75  
EVENT LEGEND : CENTER=50-75-FT  
NUM. FIELDS : 1

FIELD 1 : 121  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0501,0750.

\*\*\*\*\*  
EVENT NAME : C100  
EVENT LEGEND : CENTER=75-100-FT  
NUM. FIELDS : 1

FIELD 1 : 121  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0751,1000.

\*\*\*\*\*  
EVENT NAME : C500  
EVENT LEGEND : CENTER=5T-100-FT  
NUM. FIELDS : 1

FIELD 1 : 121  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 1001,5000.

\*\*\*\*\*  
EVENT NAME : BOW1  
EVENT LEGEND : DAMAGE-FROM-BOW-ONLY  
NUM. FIELDS : 1

FIELD 1 : 120  
NUM. CONDS. : 1 INCL  
CONDITION 1 : B.B.


\*\*\*\*\*  
EVENT NAME : UNKR  
EVENT LEGEND : DAMAGE-UNKNOWN-END  
NUM. FIELDS : 1

FIELD 1 : 120  
NUM. CONDS. : 1 INCL  
CONDITION 1 : U,U.

\*\*\*\*\*  
EVENT NAME : V25  
EVENT LEGEND : VERT-FROM-BOTT=LT-25  
NUM. FIELDS : 1

FIELD 1 : 122  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 000,025.

\*\*\*\*\*



C-12

EVENT NAME : V50  
EVENT LEGEND : VERT-FROM-BOTT=25-50  
NUM. FIELDS : 1

FIELD 1 : 122  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 026,050.

\*\*\*\*\*  
EVENT NAME : V75  
EVENT LEGEND : VERT-FROM-BOTT=50-75  
NUM. FIELDS : 1

FIELD 1 : 122  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 051,075.

\*\*\*\*\*  
EVENT NAME : V100  
EVENT LEGEND : VERT-FROM-BOT=75-100  
NUM. FIELDS : 1

FIELD 1 : 122  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 076,100.

\*\*\*\*\*  
EVENT NAME : V500  
EVENT LEGEND : VERT-FROM-BOT=5T-100  
NUM. FIELDS : 1

FIELD 1 : 122  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 101,500.

\*\*\*\*\*  
EVENT NAME : L100  
EVENT LEGEND : IAREA=L.T-100-FT  
NUM. FIELDS : 1

FIELD 1 : 128  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0000,0000.

\*\*\*\*\*  
EVENT NAME : ALT1  
EVENT LEGEND : IAREA=0-1-FT  
NUM. FIELDS : 1

FIELD 1 : 129  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0000,0100.

\*\*\*\*\*

4

C-13

EVENT NAME : ALT2  
EVENT LEGEND : IAREA=1-2-FT  
NUM. FIELDS : 1

FIELD 1 : 129  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0101,0200.

\*\*\*\*\*  
EVENT NAME : ALT3  
EVENT LEGEND : IAREA=2-3-FT  
NUM. FIELDS : 1

FIELD 1 : 129  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0201,0300.

\*\*\*\*\*  
EVENT NAME : ALT5  
EVENT LEGEND : IAREA=3-5-FT  
NUM. FIELDS : 1

FIELD 1 : 129  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0301,0500.

\*\*\*\*\*  
EVENT NAME : AL10  
EVENT LEGEND : IAREA=5-10-FT  
NUM. FIELDS : 1

FIELD 1 : 129  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0501,1000.

\*\*\*\*\*  
EVENT NAME : LLT1  
EVENT LEGEND : CRACK-LENG=LT-1-FT  
NUM. FIELDS : 1

FIELD 1 : 132  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0000,0010.

\*\*\*\*\*  
EVENT NAME : LLT3  
EVENT LEGEND : CRACK-LENG=1-3-FT  
NUM. FIELDS : 1

FIELD 1 : 132  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0011,0030.

\*\*\*\*\*

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EVENT NAME : LLT6  
 EVENT LEGEND : CRACK-LENG=3-6-FT  
 NUM. FIELDS : 1

FIELD 1 : 132  
 NUM. CONDS. : 1 INCL  
 CONDITION 1 : 0031,0060.

\*\*\*\*\*  
 EVENT NAME : LL10  
 EVENT LEGEND : CRACK-LENG=6-10-FT  
 NUM. FIELDS : 1

FIELD 1 : 132  
 NUM. CONDS. : 1 INCL  
 CONDITION 1 : 0061,0100.

\*\*\*\*\*  
 EVENT NAME : AG10  
 EVENT LEGEND : IAREA=GT-10-FT  
 NUM. FIELDS : 1

FIELD 1 : 129  
 NUM. CONDS. : 1 INCL  
 CONDITION 1 : 1001,9997.

\*\*\*\*\*  
 EVENT NAME : LG10  
 EVENT LEGEND : CRACK-LENG=GT-10-FT  
 NUM. FIELDS : 1

FIELD 1 : 132  
 NUM. CONDS. : 1 INCL  
 CONDITION 1 : 0101,9997.

\*\*\*\*\*  
 EVENT NAME : RUPT  
 EVENT LEGEND : HULL-RUPTURED  
 NUM. FIELDS : 1

FIELD 1 : 157  
 NUM. CONDS. : 1 INCL  
 CONDITION 1 : Y, Y.

\*\*\*\*\*  
 EVENT NAME : RUPN  
 EVENT LEGEND : HULL-NOT-RUPTURED  
 NUM. FIELDS : 1

FIELD 1 : 157  
 NUM. CONDS. : 1 INCL  
 CONDITION 1 : N, N.

C-15

EVENT NAME : CDYN  
EVENT LEGEND : DYNAMIC-CAUS-G/R/C/H  
NUM. FIELDS : 1

FIELD 1 : 150  
NUM. CONDS. : 4 INCL  
CONDITION 1 : G,G.  
CONDITION 2 : R,R.  
CONDITION 3 : C,C.  
CONDITION 4 : H,H.

\*\*\*\*\*  
EVENT NAME : CSF  
EVENT LEGEND : STRUCT-FAILURE-CAUSE  
NUM. FIELDS : 1

FIELD 1 : 150  
NUM. CONDS. : 1 INCL  
CONDITION 1 : F,F.

\*\*\*\*\*  
EVENT NAME : CSER  
EVENT LEGEND : IN-SERVICE-CAUSE  
NUM. FIELDS : 1

FIELD 1 : 150  
NUM. CONDS. : 1 INCL  
CONDITION 1 : S,S.

\*\*\*\*\*  
EVENT NAME : CCA  
EVENT LEGEND : CARGO-ACTION-CAUSE  
NUM. FIELDS : 1

FIELD 1 : 150  
NUM. CONDS. : 1 INCL  
CONDITION 1 : A,A.

\*\*\*\*\*  
EVENT NAME : CP10  
EVENT LEGEND : CLONG-LENGTH=0-10%  
NUM. FIELDS : 1

FIELD 1 : 156  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0000,0010.

\*\*\*\*\*  
EVENT NAME : CP20  
EVENT LEGEND : CLONG-LENGTH=11-20%  
NUM. FIELDS : 1

FIELD 1 : 156  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0011,0020.

(5)

EVENT NAME : CP40  
EVENT LEGEND : CLONG-LENGTH=31-40%  
NUM. FIELDS : 1

FIELD 1 : 156  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0031,0040.

\*\*\*\*\*  
EVENT NAME : CP50  
EVENT LEGEND : CLONG-LENGTH=41-50%  
NUM. FIELDS : 1

FIELD 1 : 156  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0041,0050.

\*\*\*\*\*  
EVENT NAME : CP60  
EVENT LEGEND : CLONG-LENGTH=51-60%  
NUM. FIELDS : 1

FIELD 1 : 156  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0051,0060.

\*\*\*\*\*  
EVENT NAME : CP70  
EVENT LEGEND : CLONG-LENGTH=61-70%  
NUM. FIELDS : 1

FIELD 1 : 156  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0061,0070.

\*\*\*\*\*  
EVENT NAME : CP99  
EVENT LEGEND : CLONG-LENGTH=71-100%  
NUM. FIELDS : 1

FIELD 1 : 156  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0071,0100.

\*\*\*\*\*  
EVENT NAME : BOTM  
EVENT LEGEND : VERTICAL EXTENT L.T.  
NUM. FIELDS : 1

FIELD 1 : 126  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 000,020.

\*\*\*\*\*

(32)

EVENT NAME : V20  
EVENT LEGEND : VERTICAL C.L. L.T. 2  
NUM. FIELDS : 1

FIELD 1 : 122  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 000,020.

\*\*\*\*\*  
EVENT NAME : V10  
EVENT LEGEND : VERTICAL C.L. L.T. 1  
NUM. FIELDS : 1

FIELD 1 : 122  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 000,010.

\*\*\*\*\*  
EVENT NAME : RP10  
EVENT LEGEND : RLONG-LENGTH=0-10%  
NUM. FIELDS : 1

FIELD 1 : 155  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0000,0010.

\*\*\*\*\*  
EVENT NAME : RP20  
EVENT LEGEND : RLONG-LENGTH=11-20%  
NUM. FIELDS : 1

FIELD 1 : 155  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0011,0020.

\*\*\*\*\*  
EVENT NAME : RP30  
EVENT LEGEND : RLONG-LENGTH=21-30%  
NUM. FIELDS : 1

FIELD 1 : 155  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0021,0030.

\*\*\*\*\*  
EVENT NAME : RP40  
EVENT LEGEND : RLONG-LENGTH=31-40%  
NUM. FIELDS : 1

FIELD 1 : 155  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0031,0040.

\*\*\*\*\*

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**C-18**

EVENT NAME : RP50  
EVENT LEGEND : PLONG-LENGTH=41-50%  
NUM. FIELDS : 1

FIELD 1 : 155  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0041,0050.

EVENT NAME : PF60  
EVENT LEGEND : PLONG-LENGTH=51-60%  
NUM. FIELDS : 1

FIELD 1 : 155  
NUM. CONDS. : 1 INCL  
CONDITION 1 : 0051.0050

**APPENDIX D**

**SALTS ANALYSIS RESULTS**

(55)  
56+

(57)  
58

EXHIBIT D-1. LOGIC TREE FOR ANALYZING DAMAGE CENTERLINE DISTANCE  
FROM BOW--ALL DAMAGE

*****										
NODE NAME?			ALL							
NO.	NAME	EVENT	WEIGHT	--P--	--C--	-N/D-	--S1--	--S2--	--PT--	--PP--
1	LEVO	EDM1	100.00	869	1289	0	100.00	0.	100.00	100.00
2	PAS	PAS	7.14	244	244	0	28.08	0.	28.08	28.08
3	PAB	PAB	7.14	179	179	0	20.60	0.	20.60	20.60
4	PAD	PAD	7.14	30	30	0	3.45	0.	3.45	3.45
5	PHE	PHE	7.14	93	93	0	10.70	0.	10.70	10.70
6	KSB	KSB	7.14	96	96	0	11.05	0.	11.05	11.05
7	KSD	KSD	7.14	59	59	0	6.79	0.	6.79	6.79
8	KES	KES	7.14	46	46	0	5.29	0.	5.29	5.29
9	KED	KED	7.14	28	28	0	3.22	0.	3.22	3.22
10	KEB	KEB	7.14	42	42	0	4.83	0.	4.83	4.83
11	UPC	UPC	7.14	7	7	0	.81	0.	.81	.81
12	LWC	LWC	7.14	28	28	0	3.22	0.	3.22	3.22
13	COM	COM	7.14	8	8	0	.92	0.	.92	.92
14	????		7.14	0	0	0	0.	0.	0.	0.
15	\$\$\$\$		7.14	9	9	0	1.04	0.	1.04	1.04
16	10A	CP10	10.00	78	78	0	8.98	0.	8.98	31.97
17	20A	CP20	10.00	44	44	0	5.06	0.	5.06	18.03
18	30A	CP30	10.00	35	35	0	4.03	0.	4.03	14.34
19	40A	CP40	10.00	27	27	0	3.11	0.	3.11	11.07
20	50A	CP50	10.00	26	26	0	2.99	0.	2.99	10.66
21	60A	CP60	10.00	13	13	0	1.50	0.	1.50	5.33
22	70A	CP70	10.00	3	3	0	.35	0.	.35	1.23
23	99A	CP99	10.00	2	2	0	.23	0.	.23	.82
24	????		10.00	0	0	0	0.	0.	0.	0.
25	\$\$\$\$		10.00	16	16	0	1.84	0.	1.84	6.56
26	10B	CP10	10.00	17	17	0	1.96	0.	1.96	9.50
27	20B	CP20	10.00	47	47	0	5.41	0.	5.41	26.26
28	30B	CP30	10.00	30	30	0	3.45	0.	3.45	16.76
29	40B	CP40	10.00	35	35	0	4.03	0.	4.03	19.55
30	50B	CP50	10.00	29	29	0	3.34	0.	3.34	16.20
31	60B	CP60	10.00	8	8	0	.92	0.	.92	4.47
32	70B	CP70	10.00	3	3	0	.35	0.	.35	1.68
33	99B	CP99	10.00	0	0	0	0.	0.	0.	0.
34	????		10.00	0	0	0	0.	0.	0.	0.
35	\$\$\$\$		10.00	10	10	0	1.15	0.	1.15	5.59
36	10C	CP10	10.00	10	10	0	1.15	0.	1.15	33.33
37	20C	CP20	10.00	5	5	0	.58	0.	.58	16.67
38	30C	CP30	10.00	6	6	0	.69	0.	.69	20.00
39	40C	CP40	10.00	3	3	0	.35	0.	.35	10.00
40	50C	CP50	10.00	3	3	0	.35	0.	.35	10.00
41	60C	CP60	10.00	0	0	0	0.	0.	0.	0.
42	70C	CP70	10.00	0	0	0	0.	0.	0.	0.
43	99C	CP99	10.00	0	0	0	0.	0.	0.	0.
44	????		10.00	0	0	0	0.	0.	0.	0.
45	\$\$\$\$		10.00	3	3	0	.35	0.	.35	10.00
46	10D	CP10	10.00	41	41	0	4.72	0.	4.72	44.09
47	20D	CP20	10.00	7	7	0	.81	0.	.81	7.53
48	30D	CP30	10.00	0	0	0	0.	0.	0.	0.
49	40D	CP40	10.00	0	0	0	0.	0.	0.	0.
50	50D	CP50	10.00	0	0	0	0.	0.	0.	0.
51	60D	CP60	10.00	0	0	0	0.	0.	0.	0.
52	70D	CP70	10.00	0	0	0	0.	0.	0.	0.
53	99D	CP99	10.00	0	0	0	0.	0.	0.	0.
54	????		10.00	0	0	0	0.	0.	0.	0.
55	\$\$\$\$		10.00	45	45	0	5.18	0.	5.18	49.39
56	10E	CP10	10.00	12	12	0	1.38	0.	1.38	12.50
57	20E	CP20	10.00	24	24	0	2.76	0.	2.76	25.00
58	30E	CP30	10.00	15	15	0	1.73	0.	1.73	15.63
59	40E	CP40	10.00	10	10	0	1.15	0.	1.15	10.42
60	50E	CP50	10.00	23	23	0	2.65	0.	2.65	23.96
61	60E	CP60	10.00	4	4	0	.46	0.	.46	4.17

## D-2

## EXHIBIT D-1. (Continued)

62	70E	CP70	10.00	0	0	0	0.	0.	0.	0.
63	99E	CP99	10.00	0	0	0	0.	0.	0.	0.
64	????		10.00	0	0	0	0.	0.	0.	0.
65	\$\$\$		10.00	8	8	0	.92	0.	.92	8.33
66	10F	CP10	10.00	15	15	0	1.73	0.	1.73	25.42
67	20F	CP20	10.00	5	5	0	.58	0.	.58	8.47
68	30F	CP30	10.00	12	12	0	1.38	0.	1.38	20.34
69	40F	CP40	10.00	10	10	0	1.15	0.	1.15	16.95
70	50F	CP50	10.00	8	8	0	.92	0.	.92	13.56
71	60F	CP60	10.00	3	3	0	.35	0.	.35	5.08
72	70F	CP70	10.00	1	1	0	.12	0.	.12	1.69
73	99F	CP99	10.00	0	0	0	0.	0.	0.	0.
74	????		10.00	0	0	0	0.	0.	0.	0.
75	\$\$\$		10.00	5	5	0	.58	0.	.58	8.47
76	10G	CP10	10.00	19	19	0	2.19	0.	2.19	41.30
77	20G	CP20	10.00	2	2	0	.23	0.	.23	4.35
78	30G	CP30	10.00	1	1	0	.12	0.	.12	2.17
79	40G	CP40	10.00	0	0	0	0.	0.	0.	0.
80	50G	CP50	10.00	0	0	0	0.	0.	0.	0.
81	60G	CP60	10.00	0	0	0	0.	0.	0.	0.
82	70G	CP70	10.00	0	0	0	0.	0.	0.	0.
83	99G	CP99	10.00	0	0	0	0.	0.	0.	0.
84	????		10.00	0	0	0	0.	0.	0.	0.
85	\$\$\$		10.00	24	24	0	2.76	0.	2.76	52.17
86	10H	CP10	10.00	2	2	0	.23	0.	.23	7.14
87	20H	CP20	10.00	0	0	0	0.	0.	0.	0.
88	30H	CP30	10.00	0	0	0	0.	0.	0.	0.
89	40H	CP40	10.00	0	0	0	0.	0.	0.	0.
90	50H	CP50	10.00	0	0	0	0.	0.	0.	0.
91	60H	CP60	10.00	0	0	0	0.	0.	0.	0.
92	70H	CP70	10.00	0	0	0	0.	0.	0.	0.
93	99H	CP99	10.00	0	0	0	0.	0.	0.	0.
94	????		10.00	0	0	0	0.	0.	0.	0.
95	\$\$\$		10.00	26	26	0	2.99	0.	2.99	92.86
96	10I	CP10	10.00	18	18	0	2.07	0.	2.07	42.86
97	20I	CP20	10.00	8	8	0	.92	0.	.92	19.05
98	30I	CP30	10.00	2	2	0	.23	0.	.23	4.76
99	40I	CP40	10.00	0	0	0	0.	0.	0.	0.
100	50I	CP50	10.00	1	1	0	.12	0.	.12	2.38
101	60I	CP60	10.00	0	0	0	0.	0.	0.	0.
102	70I	CP70	10.00	0	0	0	0.	0.	0.	0.
103	99I	CP99	10.00	0	0	0	0.	0.	0.	0.
104	????		10.00	0	0	0	0.	0.	0.	0.
105	\$\$\$		10.00	13	13	0	1.50	0.	1.50	30.95
106	10J	CP10	10.00	0	0	0	0.	0.	0.	0.
107	20J	CP20	10.00	0	0	0	0.	0.	0.	0.
108	30J	CP30	10.00	0	0	0	0.	0.	0.	0.
109	40J	CP40	10.00	0	0	0	0.	0.	0.	0.
110	50J	CP50	10.00	1	1	0	.12	0.	.12	14.29
111	60J	CP60	10.00	0	0	0	0.	0.	0.	0.
112	70J	CP70	10.00	0	0	0	0.	0.	0.	0.
113	99J	CP99	10.00	1	1	0	.12	0.	.12	14.29
114	????		10.00	0	0	0	0.	0.	0.	0.
115	\$\$\$		10.00	5	5	0	.58	0.	.58	71.43
116	10K	CP10	10.00	17	17	0	1.96	0.	1.96	60.71
117	20K	CP20	10.00	5	5	0	.58	0.	.58	17.86
118	30K	CP30	10.00	0	0	0	0.	0.	0.	0.
119	40K	CP40	10.00	0	0	0	0.	0.	0.	0.
120	50K	CP50	10.00	2	2	0	.23	0.	.23	7.14
121	60K	CP60	10.00	0	0	0	0.	0.	0.	0.
122	70K	CP70	10.00	0	0	0	0.	0.	0.	0.
123	99K	CP99	10.00	0	0	0	0.	0.	0.	0.
124	????		10.00	0	0	0	0.	0.	0.	0.

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## EXHIBIT D-1 (Continued)

125	\$\$\$	10.00	4	4	0	.46	0.	.46	14.29
126	10L CP10	10.00	1	1	0	.12	0.	.12	12.50
127	20L CP20	10.00	1	1	0	.12	0.	.12	12.50
128	30L CP30	10.00	0	0	0	0.	0.	0.	0.
129	40L CP40	10.00	0	0	0	0.	0.	0.	0.
130	50L CP50	10.00	3	3	0	.35	0.	.35	37.50
131	60L CP60	10.00	1	1	0	.12	0.	.12	12.50
132	70L CP70	10.00	1	1	0	.12	0.	.12	12.50
133	99L CP99	10.00	0	0	0	0.	0.	0.	0.
134	????	10.00	0	0	0	0.	0.	0.	0.
135	1111	10.00	1	1	0	.12	0.	.12	12.50

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**EXHIBIT D-2. LOGIC TREE FOR ANALYZING DAMAGE CENTERLINE  
DISTANCE FROM BOW--HULL RUPTURES**

*****											
NODE NAME?			ALL								
NO.	NAME	EVENT	WEIGHT	--R--	--C--	-N/O-	--S1--	--S2--	--PT--	--PP--	
1	LEVO	RPT	100.00	497	869	0	100.00	0.	100.00	100.00	100.00
2	PAS	PAS	7.14	157	157	0	31.59	0.	31.59	31.59	31.59
3	PAB	PAB	7.14	90	90	0	18.11	0.	18.11	18.11	18.11
4	PAD	PAD	7.14	15	15	0	3.02	0.	3.02	3.02	3.02
5	PAE	PAE	7.14	57	57	0	11.47	0.	11.47	11.47	11.47
6	KSB	KS	7.14	48	48	0	9.66	0.	9.66	9.66	9.66
7	KSD	KSD	7.14	30	30	0	6.04	0.	6.04	6.04	6.04
8	KES	KES	7.14	23	23	0	4.63	0.	4.63	4.63	4.63
9	KED	KED	7.14	24	24	0	4.83	0.	4.83	4.83	4.83
10	KEB	KEB	7.14	21	21	0	4.23	0.	4.23	4.23	4.23
11	UPC	UPC	7.14	4	4	0	.80	0.	.80	.80	.80
12	LWC	LWC	7.14	17	17	0	3.42	0.	3.42	3.42	3.42
13	COM	COM	7.14	6	6	0	1.21	0.	1.21	1.21	1.21
14	????		7.14	0	0	0	0.	0.	0.	0.	0.
15	\$\$\$		7.14	5	5	0	1.01	0.	1.01	1.01	1.01
16	10A	CP10	10.00	57	57	0	11.47	0.	11.47	36.31	36.31
17	20A	CP20	10.00	28	28	0	5.63	0.	5.63	17.83	17.83
18	30A	CP30	10.00	28	28	0	5.63	0.	5.63	17.83	17.83
19	40A	CP40	10.00	12	12	0	2.41	0.	2.41	7.64	7.64
20	50A	CP50	10.00	15	15	0	3.02	0.	3.02	9.55	9.55
21	60A	CP60	10.00	8	8	0	1.61	0.	1.61	5.10	5.10
22	70A	CP70	10.00	2	2	0	.40	0.	.40	1.27	1.27
23	99A	CP99	10.00	1	1	0	.20	0.	.20	.64	.64
24	????		10.00	0	0	0	0.	0.	0.	0.	0.
25	\$\$\$		10.00	6	6	0	1.21	0.	1.21	3.82	3.82
26	10B	CP10	10.00	11	11	0	2.21	0.	2.21	12.22	12.22
27	20B	CP20	10.00	27	27	0	5.43	0.	5.43	30.00	30.00
28	30B	CP30	10.00	14	14	0	2.82	0.	2.82	15.56	15.56
29	40B	CP40	10.00	18	18	0	3.62	0.	3.62	20.00	20.00
30	50B	CP50	10.00	13	13	0	2.62	0.	2.62	14.44	14.44
31	60B	CP60	10.00	3	3	0	.60	0.	.60	3.33	3.33
32	70B	CP70	10.00	0	0	0	0.	0.	0.	0.	0.
33	99B	CP99	10.00	0	0	0	0.	0.	0.	0.	0.
34	????		10.00	0	0	0	0.	0.	0.	0.	0.
35	\$\$\$		10.00	4	4	0	.80	0.	.80	4.44	4.44
36	10C	CP10	10.00	5	5	0	1.01	0.	1.01	33.33	33.33
37	20C	CP20	10.00	2	2	0	.40	0.	.40	13.33	13.33
38	30C	CP30	10.00	1	1	0	.20	0.	.20	6.67	6.67
39	40C	CP40	10.00	1	1	0	.20	0.	.20	6.67	6.67
40	50C	CP50	10.00	3	3	0	.60	0.	.60	20.00	20.00
41	60C	CP60	10.00	0	0	0	0.	0.	0.	0.	0.
42	70C	CP70	10.00	0	0	0	0.	0.	0.	0.	0.
43	99C	CP99	10.00	0	0	0	0.	0.	0.	0.	0.
44	????		10.00	0	0	0	0.	0.	0.	0.	0.
45	\$\$\$		10.00	3	3	0	.60	0.	.60	20.00	20.00
46	10D	CP10	10.00	19	19	0	3.82	0.	3.82	33.33	33.33
47	20D	CP20	10.00	1	1	0	.20	0.	.20	1.75	1.75
48	30D	CP30	10.00	0	0	0	0.	0.	0.	0.	0.
49	40D	CP40	10.00	0	0	0	0.	0.	0.	0.	0.
50	50D	CP50	10.00	0	0	0	0.	0.	0.	0.	0.
51	60D	CP60	10.00	0	0	0	0.	0.	0.	0.	0.
52	70D	CP70	10.00	0	0	0	0.	0.	0.	0.	0.
53	99D	CP99	10.00	0	0	0	0.	0.	0.	0.	0.
54	????		10.00	0	0	0	0.	0.	0.	0.	0.

## EXHIBIT D-2. (Continued)

55	\$\$\$	10.00	37	37	0	7.44	0.	7.44	64.91
56	10E CP10	10.00	8	8	0	1.61	0.	1.61	16.67
57	20E CP20	10.00	12	12	0	2.41	0.	2.41	25.00
58	30E CP30	10.00	11	11	0	2.21	0.	2.21	22.92
59	40E CP40	10.00	2	2	0	.40	0.	.40	4.17
60	50E CP50	10.00	9	9	0	1.81	0.	1.81	18.75
61	60E CP60	10.00	2	2	0	.40	0.	.40	4.17
62	70E CP70	10.00	0	0	0	0.	0.	0.	0.
63	99E CP99	10.00	0	0	0	0.	0.	0.	0.
64	????	10.00	0	0	0	0.	0.	0.	0.
65	\$\$\$	10.00	4	4	0	.80	0.	.80	8.33
66	10F CP10	10.00	7	7	0	1.41	0.	1.41	23.33
67	20F CP20	10.00	4	4	0	.80	0.	.80	13.33
68	30F CP30	10.00	4	4	0	.80	0.	.80	13.33
69	40F CP40	10.00	7	7	0	1.41	0.	1.41	23.33
70	50F CP50	10.00	4	4	0	.80	0.	.80	13.33
71	60F CP60	10.00	1	1	0	.20	0.	.20	3.33
72	70F CP70	10.00	0	0	0	0.	0.	0.	0.
73	99F CP99	10.00	0	0	0	0.	0.	0.	0.
74	????	10.00	0	0	0	0.	0.	0.	0.
75	\$\$\$	10.00	3	3	0	.60	0.	.60	10.00
76	10G CP10	10.00	6	6	0	1.21	0.	1.21	26.09
77	20G CP20	10.00	0	0	0	0.	0.	0.	0.
78	30G CP30	10.00	0	0	0	0.	0.	0.	0.
79	40G CP40	10.00	0	0	0	0.	0.	0.	0.
80	50G CP50	10.00	0	0	0	0.	0.	0.	0.
81	60G CP60	10.00	0	0	0	0.	0.	0.	0.
82	70G CP70	10.00	0	0	0	0.	0.	0.	0.
83	99G CP99	10.00	0	0	0	0.	0.	0.	0.
84	????	10.00	0	0	0	0.	0.	0.	0.
85	\$\$\$	10.00	17	17	0	3.42	0.	3.42	73.91
86	10H CP10	10.00	2	2	0	.40	0.	.40	8.33
87	20H CP20	10.00	0	0	0	0.	0.	0.	0.
88	30H CP30	10.00	0	0	0	0.	0.	0.	0.
89	40H CP40	10.00	0	0	0	0.	0.	0.	0.
90	50H CP50	10.00	0	0	0	0.	0.	0.	0.
91	60H CP60	10.00	0	0	0	0.	0.	0.	0.
92	70H CP70	10.00	0	0	0	0.	0.	0.	0.
93	99H CP99	10.00	0	0	0	0.	0.	0.	0.
94	????	10.00	0	0	0	0.	0.	0.	0.
95	\$\$\$	10.00	22	22	0	4.43	0.	4.43	91.67
96	10I CP10	10.00	7	7	0	1.41	0.	1.41	33.33
97	20I CP20	10.00	5	5	0	1.01	0.	1.01	23.81
98	30I CP30	10.00	0	0	0	0.	0.	0.	0.
99	40I CP40	10.00	0	0	0	0.	0.	0.	0.
100	50I CP50	10.00	1	1	0	.20	0.	.20	4.76
101	60I CP60	10.00	0	0	0	0.	0.	0.	0.
102	70I CP70	10.00	0	0	0	0.	0.	0.	0.
103	99I CP99	10.00	0	0	0	0.	0.	0.	0.
104	????	10.00	0	0	0	0.	0.	0.	0.
105	\$\$\$	10.00	8	8	0	1.61	0.	1.61	38.10
106	10J CP10	10.00	0	0	0	0.	0.	0.	0.
107	20J CP20	10.00	0	0	0	0.	0.	0.	0.
108	30J CP30	10.00	0	0	0	0.	0.	0.	0.
109	40J CP40	10.00	0	0	0	0.	0.	0.	0.
110	50J CP50	10.00	0	0	0	0.	0.	0.	0.
111	60J CP60	10.00	0	0	0	0.	0.	0.	0.
112	70J CP70	10.00	0	0	0	0.	0.	0.	0.
113	99J CP99	10.00	0	0	0	0.	0.	0.	0.
114	????	10.00	0	0	0	0.	0.	0.	0.

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## EXHIBIT D-2 (Continued)

115	\$\$\$\$		10.00	4	4	0	.80	0.	.80	100.00
116	10K CP10		10.00	9	9	0	1.81	0.	1.81	52.94
117	20K CP20		10.00	4	4	0	.80	0.	.80	23.53
118	30K CP30		10.00	0	0	0	0.	0.	0.	0.
119	40K CP40		10.00	0	0	0	0.	0.	0.	0.
120	50K CP50		10.00	0	0	0	0.	0.	0.	0.
121	60K CP60		10.00	0	0	0	0.	0.	0.	0.
122	70K CP70		10.00	0	0	0	0.	0.	0.	0.
123	99K CP99		10.00	0	0	0	0.	0.	0.	0.
124	????		10.00	0	0	0	0.	0.	0.	0.
125	\$\$\$\$		10.00	4	4	0	.80	0.	.80	23.53
126	10L CP10		10.00	1	1	0	.20	0.	.20	16.67
127	20L CP20		10.00	1	1	0	.20	0.	.20	16.67
128	30L CP30		10.00	0	0	0	0.	0.	0.	0.
129	40L CP40		10.00	0	0	0	0.	0.	0.	0.
130	50L CP50		10.00	2	2	0	.40	0.	.40	33.33
131	60L CP60		10.00	1	1	0	.20	0.	.20	16.67
132	70L CP70		10.00	1	1	0	.20	0.	.20	16.67
133	99L CP99		10.00	0	0	0	0.	0.	0.	0.
134	????		10.00	0	0	0	0.	0.	0.	0.
135	\$\$\$\$		10.00	0	0	0	0.	0.	0.	0.

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EXHIBIT D-3. LOGIC DIAGRAM FOR ANALYZING DAMAGE CENTERLINE  
DISTANCE FROM BOW--CRACKS

*****										
NO.	NAME	EVENT	WEIGHT	ABL						
				--P--	--C--	--N/D--	--S1--	--S2--	--PT--	--PP--
1	LEVO	BOW1	100.00	280	436	0	100.00	0.	100.00	100.00
2	PAS	PAS	7.14	101	101	0	36.07	0.	36.07	36.07
3	PAB	PAB	7.14	41	41	0	14.64	0.	14.64	14.64
4	PAD	PAD	7.14	8	8	0	2.86	0.	2.86	2.86
5	PAE	PAE	7.14	31	31	0	11.07	0.	11.07	11.07
6	KSE	KSE	7.14	25	25	0	8.93	0.	8.93	8.93
7	KSD	KSD	7.14	24	24	0	8.57	0.	8.57	8.57
8	KES	KES	7.14	13	13	0	4.64	0.	4.64	4.64
9	KED	KED	7.14	14	14	0	5.00	0.	5.00	5.00
10	KEB	KEB	7.14	7	7	0	2.50	0.	2.50	2.50
11	UPC	UPC	7.14	3	3	0	1.07	0.	1.07	1.07
12	LWC	LWC	7.14	6	6	0	2.14	0.	2.14	2.14
13	COM	COM	7.14	4	4	0	1.43	0.	1.43	1.43
14	???		7.14	0	0	0	0.	0.	0.	0.
15	\$\$\$		7.14	3	3	0	1.07	0.	1.07	1.07
16	10A	CP10	10.00	35	35	0	12.50	0.	12.50	34.65
17	20A	CP20	10.00	20	20	0	7.14	0.	7.14	19.80
18	30A	CP30	10.00	15	15	0	5.36	0.	5.36	14.85
19	40A	CP40	10.00	8	8	0	2.86	0.	2.86	7.92
20	50A	CP50	10.00	9	9	0	3.21	0.	3.21	8.91
21	60A	CP60	10.00	7	7	0	2.50	0.	2.50	6.93
22	70A	CP70	10.00	1	1	0	.36	0.	.36	.99
23	99A	CP99	10.00	1	1	0	.36	0.	.36	.99
24	???		10.00	0	0	0	0.	0.	0.	0.
25	\$\$\$		10.00	5	5	0	1.79	0.	1.79	4.95
26	10B	CP10	10.00	4	4	0	1.43	0.	1.43	9.76
27	20B	CP20	10.00	13	13	0	4.64	0.	4.64	31.71
28	30B	CP30	10.00	8	8	0	2.86	0.	2.86	19.51
29	40B	CP40	10.00	6	6	0	2.14	0.	2.14	14.63
30	50B	CP50	10.00	8	8	0	2.86	0.	2.86	19.51
31	60B	CP60	10.00	1	1	0	.36	0.	.36	2.44
32	70B	CP70	10.00	0	0	0	0.	0.	0.	0.
33	99B	CP99	10.00	0	0	0	0.	0.	0.	0.
34	???		10.00	0	0	0	0.	0.	0.	0.
35	\$\$\$		10.00	1	1	0	.36	0.	.36	2.44
36	10C	CP10	10.00	2	2	0	.71	0.	.71	25.00
37	20C	CP20	10.00	1	1	0	.36	0.	.36	12.50
38	30C	CP30	10.00	1	1	0	.36	0.	.36	12.50
39	40C	CP40	10.00	0	0	0	0.	0.	0.	0.
40	50C	CP50	10.00	2	2	0	.71	0.	.71	25.00
41	60C	CP60	10.00	0	0	0	0.	0.	0.	0.
42	70C	CP70	10.00	0	0	0	0.	0.	0.	0.
43	99C	CP99	10.00	0	0	0	0.	0.	0.	0.
44	???		10.00	0	0	0	0.	0.	0.	0.
45	\$\$\$		10.00	2	2	0	.71	0.	.71	25.00
46	10D	CP10	10.00	5	5	0	1.79	0.	1.79	16.13
47	20D	CP20	10.00	1	1	0	.36	0.	.36	3.23
48	30D	CP30	10.00	0	0	0	0.	0.	0.	0.
49	40D	CP40	10.00	0	0	0	0.	0.	0.	0.
50	50D	CP50	10.00	0	0	0	0.	0.	0.	0.
51	60D	CP60	10.00	0	0	0	0.	0.	0.	0.
52	70D	CP70	10.00	0	0	0	0.	0.	0.	0.
53	99D	CP99	10.00	0	0	0	0.	0.	0.	0.
54	???		10.00	0	0	0	0.	0.	0.	0.
55	\$\$\$		10.00	25	25	0	8.93	0.	8.93	80.65
56	10E	CP10	10.00	3	3	0	1.07	0.	1.07	12.00
57	20E	CP20	10.00	7	7	0	2.50	0.	2.50	28.00
58	30E	CP30	10.00	7	7	0	2.50	0.	2.50	28.00
59	40E	CP40	10.00	1	1	0	.36	0.	.36	4.00
60	50E	CP50	10.00	5	5	0	1.79	0.	1.79	20.00
61	60E	CP60	10.00	1	1	0	.36	0.	.36	4.00
62	70E	CP70	10.00	0	0	0	0.	0.	0.	0.
63	99E	CP99	10.00	0	0	0	0.	0.	0.	0.
64	???		10.00	0	0	0	0.	0.	0.	0.

## EXHIBIT D-3. (Continued)

65	1111	10.00	1	1	0	.36	0.	.36	4.00
66	10F CP10	10.00	5	5	0	1.79	0.	1.79	20.83
67	20F CP20	10.00	4	4	0	1.43	0.	1.43	16.67
68	30F CP30	10.00	3	3	0	1.07	0.	1.07	12.50
69	40F CP40	10.00	6	6	0	2.14	0.	2.14	25.00
70	50F CP50	10.00	3	3	0	1.07	0.	1.07	12.50
71	60F CP60	10.00	1	1	0	.36	0.	.36	4.17
72	70F CP70	10.00	0	0	0	0.	0.	0.	0.
73	99F CP99	10.00	0	0	0	0.	0.	0.	0.
74	????	10.00	0	0	0	0.	0.	0.	0.
75	1111	10.00	2	2	0	.71	0.	.71	8.33
76	10S CP10	10.00	3	3	0	1.07	0.	1.07	23.08
77	20S CP20	10.00	0	0	0	0.	0.	0.	0.
78	30S CP30	10.00	0	0	0	0.	0.	0.	0.
79	40S CP40	10.00	0	0	0	0.	0.	0.	0.
80	50S CP50	10.00	0	0	0	0.	0.	0.	0.
81	60S CP60	10.00	0	0	0	0.	0.	0.	0.
82	70S CP70	10.00	0	0	0	0.	0.	0.	0.
83	99S CP99	10.00	0	0	0	0.	0.	0.	0.
84	????	10.00	0	0	0	0.	0.	0.	0.
85	1111	10.00	10	10	0	3.57	0.	3.57	76.92
86	10H CP10	10.00	0	0	0	0.	0.	0.	0.
87	20H CP20	10.00	0	0	0	0.	0.	0.	0.
88	30H CP30	10.00	0	0	0	0.	0.	0.	0.
89	40H CP40	10.00	0	0	0	0.	0.	0.	0.
90	50H CP50	10.00	0	0	0	0.	0.	0.	0.
91	60H CP60	10.00	0	0	0	0.	0.	0.	0.
92	70H CP70	10.00	0	0	0	0.	0.	0.	0.
93	99H CP99	10.00	0	0	0	0.	0.	0.	0.
94	????	10.00	0	0	0	0.	0.	0.	0.
95	1111	10.00	14	14	0	5.00	0.	5.00	100.00
96	10I CP10	10.00	2	2	0	.71	0.	.71	28.57
97	20I CP20	10.00	2	2	0	.71	0.	.71	28.57
98	30I CP30	10.00	0	0	0	0.	0.	0.	0.
99	40I CP40	10.00	0	0	0	0.	0.	0.	0.
100	50I CP50	10.00	0	0	0	0.	0.	0.	0.
101	60I CP60	10.00	0	0	0	0.	0.	0.	0.
102	70I CP70	10.00	0	0	0	0.	0.	0.	0.
103	99I CP99	10.00	0	0	0	0.	0.	0.	0.
104	????	10.00	0	0	0	0.	0.	0.	0.
105	1111	10.00	3	3	0	1.07	0.	1.07	42.86
106	10J CP10	10.00	0	0	0	0.	0.	0.	0.
107	20J CP20	10.00	0	0	0	0.	0.	0.	0.
108	30J CP30	10.00	0	0	0	0.	0.	0.	0.
109	40J CP40	10.00	0	0	0	0.	0.	0.	0.
110	50J CP50	10.00	0	0	0	0.	0.	0.	0.
111	60J CP60	10.00	0	0	0	0.	0.	0.	0.
112	70J CP70	10.00	0	0	0	0.	0.	0.	0.
113	99J CP99	10.00	0	0	0	0.	0.	0.	0.
114	????	10.00	0	0	0	0.	0.	0.	0.
115	1111	10.00	3	3	0	1.07	0.	1.07	100.00
116	10K CP10	10.00	2	2	0	.71	0.	.71	33.33
117	20K CP20	10.00	2	2	0	.71	0.	.71	33.33
118	30K CP30	10.00	0	0	0	0.	0.	0.	0.
119	40K CP40	10.00	0	0	0	0.	0.	0.	0.
120	50K CP50	10.00	0	0	0	0.	0.	0.	0.
121	60K CP60	10.00	0	0	0	0.	0.	0.	0.
122	70K CP70	10.00	0	0	0	0.	0.	0.	0.
123	99K CP99	10.00	0	0	0	0.	0.	0.	0.
124	????	10.00	0	0	0	0.	0.	0.	0.
125	1111	10.00	2	2	0	.71	0.	.71	33.33
126	10L CP10	10.00	1	1	0	.36	0.	.36	25.00
127	20L CP20	10.00	1	1	0	.36	0.	.36	25.00
128	30L CP30	10.00	0	0	0	0.	0.	0.	0.
129	40L CP40	10.00	0	0	0	0.	0.	0.	0.
130	50L CP50	10.00	0	0	0	0.	0.	0.	0.
131	60L CP60	10.00	1	1	0	.36	0.	.36	25.00
132	70L CP70	10.00	1	1	0	.36	0.	.36	25.00
133	99L CP99	10.00	0	0	0	0.	0.	0.	0.
134	????	10.00	0	0	0	0.	0.	0.	0.
135	1111	10.00	0	0	0	0.	0.	0.	0.

EXHIBIT D-4. LOGIC TREE FOR ANALYZING DAMAGE  
CENTERLINE FROM BOW--HOLES

*****											
NODE NAME			ALL								
NO.	NAME	EVENT	WEIGHT	--P--	--C--	--N/D--	--S1--	--S2--	--PT--	--PP--	
1	LEVO	EDW1	100.00	244	347	0	100.00	0.	100.00	100.00	
2	PAS	PAS	7.14	62	62	0	25.41	0.	25.41	25.41	
3	PAB	PAB	7.14	51	51	0	20.90	0.	20.90	20.90	
4	PAD	PAD	7.14	8	8	0	3.28	0.	3.28	3.28	
5	PAE	PAE	7.14	30	30	0	12.30	0.	12.30	12.30	
6	KSB	KSB	7.14	29	29	0	11.89	0.	11.89	11.89	
7	KSD	KSD	7.14	7	7	0	2.87	0.	2.87	2.87	
8	KES	KES	7.14	11	11	0	4.51	0.	4.51	4.51	
9	KED	KED	7.14	12	12	0	4.92	0.	4.92	4.92	
10	KEB	KEB	7.14	18	18	0	7.38	0.	7.38	7.38	
11	UPC	UPC	7.14	1	1	0	.41	0.	.41	.41	
12	LWC	LWC	7.14	10	10	0	4.10	0.	4.10	4.10	
13	COM	COM	7.14	3	3	0	1.23	0.	1.23	1.23	
14	????		7.14	0	0	0	0.	0.	0.	0.	
15	\$\$\$		7.14	2	2	0	.82	0.	.82	.82	
16	10A	CP10	10.00	24	24	0	9.84	0.	9.84	38.71	
17	20A	CP20	10.00	8	8	0	3.28	0.	3.28	12.90	
18	30A	CP30	10.00	13	13	0	5.33	0.	5.33	20.97	
19	40A	CP40	10.00	6	6	0	2.46	0.	2.46	9.68	
20	50A	CP50	10.00	4	4	0	1.64	0.	1.64	6.45	
21	60A	CP60	10.00	3	3	0	1.23	0.	1.23	4.84	
22	70A	CP70	10.00	2	2	0	.82	0.	.82	3.23	
23	99A	CP99	10.00	0	0	0	0.	0.	0.	0.	
24	????		10.00	0	0	0	0.	0.	0.	0.	
25	\$\$\$		10.00	2	2	0	.82	0.	.82	3.23	
26	10B	CP10	10.00	7	7	0	2.87	0.	2.87	13.73	
27	20B	CP20	10.00	15	15	0	6.15	0.	6.15	29.41	
28	30B	CP30	10.00	6	6	0	2.46	0.	2.46	11.76	
29	40B	CP40	10.00	14	14	0	5.74	0.	5.74	27.45	
30	50B	CP50	10.00	4	4	0	1.64	0.	1.64	7.84	
31	60B	CP60	10.00	2	2	0	.82	0.	.82	3.92	
32	70B	CP70	10.00	0	0	0	0.	0.	0.	0.	
33	99B	CP99	10.00	0	0	0	0.	0.	0.	0.	
34	????		10.00	0	0	0	0.	0.	0.	0.	
35	\$\$\$		10.00	3	3	0	1.23	0.	1.23	5.88	
36	10C	CP10	10.00	3	3	0	1.23	0.	1.23	37.50	
37	20C	CP20	10.00	2	2	0	.82	0.	.82	25.00	
38	30C	CP30	10.00	0	0	0	0.	0.	0.	0.	
39	40C	CP40	10.00	1	1	0	.41	0.	.41	12.50	
40	50C	CP50	10.00	1	1	0	.41	0.	.41	12.50	
41	60C	CP60	10.00	0	0	0	0.	0.	0.	0.	
42	70C	CP70	10.00	0	0	0	0.	0.	0.	0.	
43	99C	CP99	10.00	0	0	0	0.	0.	0.	0.	
44	????		10.00	0	0	0	0.	0.	0.	0.	
45	\$\$\$		10.00	1	1	0	.41	0.	.41	12.50	
46	10D	CP10	10.00	14	14	0	5.74	0.	5.74	46.67	
47	20D	CP20	10.00	0	0	0	0.	0.	0.	0.	
48	30D	CP30	10.00	0	0	0	0.	0.	0.	0.	
49	40D	CP40	10.00	0	0	0	0.	0.	0.	0.	
50	50D	CP50	10.00	0	0	0	0.	0.	0.	0.	
51	60D	CP60	10.00	0	0	0	0.	0.	0.	0.	
52	70D	CP70	10.00	0	0	0	0.	0.	0.	0.	
53	99D	CP99	10.00	0	0	0	0.	0.	0.	0.	
54	????		10.00	0	0	0	0.	0.	0.	0.	
55	\$\$\$		10.00	16	16	0	6.56	0.	6.56	53.33	
56	10E	CP10	10.00	5	5	0	2.05	0.	2.05	17.24	
57	20E	CP20	10.00	6	6	0	2.46	0.	2.46	20.69	
58	30E	CP30	10.00	6	6	0	2.46	0.	2.46	20.69	
59	40E	CP40	10.00	1	1	0	.41	0.	.41	3.45	
60	50E	CP50	10.00	6	6	0	2.46	0.	2.46	20.69	
61	60E	CP60	10.00	2	2	0	.82	0.	.82	6.90	
62	70E	CP70	10.00	0	0	0	0.	0.	0.	0.	
63	99E	CP99	10.00	0	0	0	0.	0.	0.	0.	
64	????		10.00	0	0	0	0.	0.	0.	0.	

## D-10

## EXHIBIT D-4. (Continued)

65	1111		10.00	3	3	0	1.23	0.	1.23	10.34
66	10F CP10		10.00	2	2	0	.82	0.	.82	28.57
67	20F CP20		10.00	1	1	0	.41	0.	.41	14.29
68	30F CP30		10.00	2	2	0	.82	0.	.82	28.57
69	40F CP40		10.00	0	0	0	0.	0.	0.	0.
70	50F CP50		10.00	1	1	0	.41	0.	.41	14.29
71	60F CP60		10.00	0	0	0	0.	0.	0.	0.
72	70F CP70		10.00	0	0	0	0.	0.	0.	0.
73	99F CP99		10.00	0	0	0	0.	0.	0.	0.
74	????		10.00	0	0	0	0.	0.	0.	0.
75	1111		10.00	1	1	0	.41	0.	.41	14.29
76	10G CP10		10.00	3	3	0	1.23	0.	1.23	27.27
77	20G CP20		10.00	0	0	0	0.	0.	0.	0.
78	30G CP30		10.00	0	0	0	0.	0.	0.	0.
79	40G CP40		10.00	0	0	0	0.	0.	0.	0.
80	50G CP50		10.00	0	0	0	0.	0.	0.	0.
81	60G CP60		10.00	0	0	0	0.	0.	0.	0.
92	70G CP70		10.00	0	0	0	0.	0.	0.	0.
83	99G CP99		10.00	0	0	0	0.	0.	0.	0.
84	????		10.00	0	0	0	0.	0.	0.	0.
85	1111		10.00	8	8	0	3.28	0.	3.28	72.73
86	10H CP10		10.00	2	2	0	.82	0.	.82	16.67
87	20H CP20		10.00	0	0	0	0.	0.	0.	0.
88	30H CP30		10.00	0	0	0	0.	0.	0.	0.
89	40H CP40		10.00	0	0	0	0.	0.	0.	0.
90	50H CP50		10.00	0	0	0	0.	0.	0.	0.
91	60H CP60		10.00	0	0	0	0.	0.	0.	0.
92	70H CP70		10.00	0	0	0	0.	0.	0.	0.
93	99H CP99		10.00	0	0	0	0.	0.	0.	0.
94	????		10.00	0	0	0	0.	0.	0.	0.
95	1111		10.00	10	10	0	4.10	0.	4.10	83.33
96	10I CP10		10.00	6	6	0	2.46	0.	2.46	33.33
97	20I CP20		10.00	4	4	0	1.64	0.	1.64	22.22
98	30I CP30		10.00	0	0	0	0.	0.	0.	0.
99	40I CP40		10.00	0	0	0	0.	0.	0.	0.
100	50I CP50		10.00	0	0	0	0.	0.	0.	0.
101	60I CP60		10.00	0	0	0	0.	0.	0.	0.
102	70I CP70		10.00	0	0	0	0.	0.	0.	0.
103	99I CP99		10.00	0	0	0	0.	0.	0.	0.
104	????		10.00	0	0	0	0.	0.	0.	0.
105	1111		10.00	8	8	0	3.28	0.	3.28	44.44
106	10J CP10		10.00	0	0	0	0.	0.	0.	0.
107	20J CP20		10.00	0	0	0	0.	0.	0.	0.
108	30J CP30		10.00	0	0	0	0.	0.	0.	0.
109	40J CP40		10.00	0	0	0	0.	0.	0.	0.
110	50J CP50		10.00	0	0	0	0.	0.	0.	0.
111	60J CP60		10.00	0	0	0	0.	0.	0.	0.
112	70J CP70		10.00	0	0	0	0.	0.	0.	0.
113	99J CP99		10.00	0	0	0	0.	0.	0.	0.
114	????		10.00	0	0	0	0.	0.	0.	0.
115	1111		10.00	1	1	0	.41	0.	.41	100.00
116	10K CP10		10.00	6	6	0	2.46	0.	2.46	60.00
117	20K CP20		10.00	2	2	0	.82	0.	.82	20.00
118	30K CP30		10.00	0	0	0	0.	0.	0.	0.
119	40K CP40		10.00	0	0	0	0.	0.	0.	0.
120	50K CP50		10.00	0	0	0	0.	0.	0.	0.
121	60K CP60		10.00	0	0	0	0.	0.	0.	0.
122	70K CP70		10.00	0	0	0	0.	0.	0.	0.
123	99K CP99		10.00	0	0	0	0.	0.	0.	0.
124	????		10.00	0	0	0	0.	0.	0.	0.
125	1111		10.00	2	2	0	.82	0.	.82	20.00
126	10L CP10		10.00	0	0	0	0.	0.	0.	0.
127	20L CP20		10.00	1	1	0	.41	0.	.41	33.33
128	30L CP30		10.00	0	0	0	0.	0.	0.	0.
129	40L CP40		10.00	0	0	0	0.	0.	0.	0.
130	50L CP50		10.00	1	1	0	.41	0.	.41	33.33
131	60L CP60		10.00	0	0	0	0.	0.	0.	0.
132	70L CP70		10.00	1	1	0	.41	0.	.41	33.33
133	99L CP99		10.00	0	0	0	0.	0.	0.	0.
134	????		10.00	0	0	0	0.	0.	0.	0.
135	1111		10.00	0	0	0	0.	0.	0.	0.

EXHIBIT D-5. LOGIC TREE FOR ANALYZING DAMAGE CENTERLINE  
DISTANCE FROM STERN--ALL DAMAGE

*****										
NODE NAME?			ALL							
NO.	NAME	EVENT	WEIGHT	--R--	--C--	-N/D-	--S1--	--S2--	--PT--	--PP--
1	LEVO	STER	100.00	362	1289	0	100.00	0.	100.00	100.00
2	PAS	PAS	7.14	94	94	0	25.97	0.	25.97	25.97
3	PAB	PAB	7.14	67	67	0	18.51	0.	18.51	18.51
4	PAD	PAD	7.14	17	17	0	4.70	0.	4.70	4.70
5	PAE	PAE	7.14	41	41	0	11.33	0.	11.33	11.33
6	KSB	KSB	7.14	45	45	0	12.43	0.	12.43	12.43
7	KSD	KSD	7.14	21	21	0	5.80	0.	5.80	5.80
8	KES	KES	7.14	32	32	0	8.84	0.	8.84	8.84
9	KED	KED	7.14	11	11	0	3.04	0.	3.04	3.04
10	KEB	KEB	7.14	7	7	0	1.93	0.	1.93	1.93
11	UPC	UPC	7.14	11	11	0	3.04	0.	3.04	3.04
12	LWC	LWC	7.14	9	9	0	2.49	0.	2.49	2.49
13	COM	COM	7.14	4	4	0	1.10	0.	1.10	1.10
14	????		7.14	0	0	0	0.	0.	0.	0.
15	\$\$\$		7.14	3	3	0	.83	0.	.83	.83
16	10A	CP10	10.00	32	32	0	8.84	0.	8.84	34.04
17	20A	CP20	10.00	22	22	0	6.08	0.	6.08	23.40
18	30A	CP30	10.00	14	14	0	3.87	0.	3.87	14.89
19	40A	CP40	10.00	8	8	0	2.21	0.	2.21	8.51
20	50A	CP50	10.00	4	4	0	1.10	0.	1.10	4.26
21	60A	CP60	10.00	3	3	0	.83	0.	.83	3.19
22	70A	CP70	10.00	1	1	0	.28	0.	.28	1.06
23	99A	CP99	10.00	0	0	0	0.	0.	0.	0.
24	????		10.00	0	0	0	0.	0.	0.	0.
25	\$\$\$		10.00	10	10	0	2.76	0.	2.76	10.64
26	10B	CP10	10.00	12	12	0	3.31	0.	3.31	17.91
27	20B	CP20	10.00	15	15	0	4.14	0.	4.14	22.39
28	30B	CP30	10.00	12	12	0	3.31	0.	3.31	17.91
29	40B	CP40	10.00	14	14	0	3.87	0.	3.87	20.90
30	50B	CP50	10.00	7	7	0	1.93	0.	1.93	10.45
31	60B	CP60	10.00	0	0	0	0.	0.	0.	0.
32	70B	CP70	10.00	1	1	0	.28	0.	.28	1.49
33	99B	CP99	10.00	3	3	0	.83	0.	.83	4.48
34	????		10.00	0	0	0	0.	0.	0.	0.
35	\$\$\$		10.00	3	3	0	.83	0.	.83	4.48
36	10C	CP10	10.00	5	5	0	1.38	0.	1.38	29.41
37	20C	CP20	10.00	5	5	0	1.38	0.	1.38	29.41
38	30C	CP30	10.00	4	4	0	1.10	0.	1.10	23.53
39	40C	CP40	10.00	1	1	0	.28	0.	.28	5.88
40	50C	CP50	10.00	0	0	0	0.	0.	0.	0.
41	60C	CP60	10.00	0	0	0	0.	0.	0.	0.
42	70C	CP70	10.00	0	0	0	0.	0.	0.	0.
43	99C	CP99	10.00	0	0	0	0.	0.	0.	0.
44	????		10.00	0	0	0	0.	0.	0.	0.
45	\$\$\$		10.00	2	2	0	.55	0.	.55	11.76
46	10D	CP10	10.00	8	8	0	2.21	0.	2.21	19.51
47	20D	CP20	10.00	0	0	0	0.	0.	0.	0.
48	30D	CP30	10.00	0	0	0	0.	0.	0.	0.
49	40D	CP40	10.00	0	0	0	0.	0.	0.	0.
50	50D	CP50	10.00	0	0	0	0.	0.	0.	0.
51	60D	CP60	10.00	0	0	0	0.	0.	0.	0.
52	70D	CP70	10.00	0	0	0	0.	0.	0.	0.
53	99D	CP99	10.00	0	0	0	0.	0.	0.	0.
54	????		10.00	0	0	0	0.	0.	0.	0.
55	\$\$\$		10.00	33	33	0	9.12	0.	9.12	80.49
56	10E	CP10	10.00	10	10	0	2.76	0.	2.76	22.22
57	20E	CP20	10.00	11	11	0	3.04	0.	3.04	24.44
58	30E	CP30	10.00	8	8	0	2.21	0.	2.21	17.78
59	40E	CP40	10.00	10	10	0	2.76	0.	2.76	22.22
60	50E	CP50	10.00	5	5	0	1.38	0.	1.38	11.11

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## EXHIBIT D-5. (Continued)

61	60E	CP60	10.00	0	0	0	0.	0.	0.	0.
62	70E	CP70	10.00	0	0	0	0.	0.	0.	0.
63	99E	CP99	10.00	0	0	0	0.	0.	0.	0.
64	????		10.00	0	0	0	0.	0.	0.	0.
65	1111		10.00	1	1	0	.28	0.	.28	2.22
66	10F	CP10	10.00	5	5	0	1.38	0.	1.38	23.81
67	20F	CP20	10.00	5	5	0	1.38	0.	1.38	23.81
68	30F	CP30	10.00	4	4	0	1.10	0.	1.10	19.05
69	40F	CP40	10.00	2	2	0	.55	0.	.55	9.52
70	50F	CP50	10.00	2	2	0	.55	0.	.55	9.52
71	60F	CP60	10.00	0	0	0	0.	0.	0.	0.
72	70F	CP70	10.00	0	0	0	0.	0.	0.	0.
73	99F	CP99	10.00	0	0	0	0.	0.	0.	0.
74	????		10.00	0	0	0	0.	0.	0.	0.
75	1111		10.00	3	3	0	.83	0.	.83	14.29
76	10G	CP10	10.00	5	5	0	1.38	0.	1.38	15.63
77	20G	CP20	10.00	0	0	0	0.	0.	0.	0.
78	30G	CP30	10.00	0	0	0	0.	0.	0.	0.
79	40G	CP40	10.00	0	0	0	0.	0.	0.	0.
80	50G	CP50	10.00	0	0	0	0.	0.	0.	0.
81	60G	CP60	10.00	0	0	0	0.	0.	0.	0.
82	70G	CP70	10.00	0	0	0	0.	0.	0.	0.
83	99G	CP99	10.00	0	0	0	0.	0.	0.	0.
84	????		10.00	0	0	0	0.	0.	0.	0.
85	1111		10.00	27	27	0	7.46	0.	7.46	84.38
86	10H	CP10	10.00	2	2	0	.55	0.	.55	18.18
87	20H	CP20	10.00	0	0	0	0.	0.	0.	0.
88	30H	CP30	10.00	0	0	0	0.	0.	0.	0.
89	40H	CP40	10.00	0	0	0	0.	0.	0.	0.
90	50H	CP50	10.00	0	0	0	0.	0.	0.	0.
91	60H	CP60	10.00	0	0	0	0.	0.	0.	0.
92	70H	CP70	10.00	0	0	0	0.	0.	0.	0.
93	99H	CP99	10.00	0	0	0	0.	0.	0.	0.
94	????		10.00	0	0	0	0.	0.	0.	0.
95	1111		10.00	9	9	0	2.49	0.	2.49	81.82
96	10I	CP10	10.00	4	4	0	1.10	0.	1.10	57.14
97	20I	CP20	10.00	1	1	0	.28	0.	.28	14.29
98	30I	CP30	10.00	0	0	0	0.	0.	0.	0.
99	40I	CP40	10.00	0	0	0	0.	0.	0.	0.
100	50I	CP50	10.00	0	0	0	0.	0.	0.	0.
101	60I	CP60	10.00	0	0	0	0.	0.	0.	0.
102	70I	CP70	10.00	0	0	0	0.	0.	0.	0.
103	99I	CP99	10.00	0	0	0	0.	0.	0.	0.
104	????		10.00	0	0	0	0.	0.	0.	0.
105	1111		10.00	2	2	0	.55	0.	.55	28.57
106	10J	CP10	10.00	0	0	0	0.	0.	0.	0.
107	20J	CP20	10.00	0	0	0	0.	0.	0.	0.
108	30J	CP30	10.00	0	0	0	0.	0.	0.	0.
109	40J	CP40	10.00	0	0	0	0.	0.	0.	0.
110	50J	CP50	10.00	0	0	0	0.	0.	0.	0.
111	60J	CP60	10.00	0	0	0	0.	0.	0.	0.
112	70J	CP70	10.00	0	0	0	0.	0.	0.	0.
113	99J	CP99	10.00	0	0	0	0.	0.	0.	0.
114	????		10.00	0	0	0	0.	0.	0.	0.
115	1111		10.00	11	11	0	3.04	0.	3.04	100.00
116	10K	CP10	10.00	5	5	0	1.38	0.	1.38	55.56
117	20K	CP20	10.00	2	2	0	.55	0.	.55	22.22
118	30K	CP30	10.00	0	0	0	0.	0.	0.	0.
119	40K	CP40	10.00	0	0	0	0.	0.	0.	0.
120	50K	CP50	10.00	0	0	0	0.	0.	0.	0.
121	60K	CP60	10.00	0	0	0	0.	0.	0.	0.
122	70K	CP70	10.00	0	0	0	0.	0.	0.	0.
123	99K	CP99	10.00	0	0	0	0.	0.	0.	0.
124	????		10.00	0	0	0	0.	0.	0.	0.

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EXHIBIT D-5 (Continued)

125 1111	10.00	2	2	0	.55	0.	.55	22.22
126 10L CP10	10.00	0	0	0	0.	0.	0.	0.
127 20L CP20	10.00	1	1	0	.28	0.	.28	25.00
128 30L CP30	10.00	2	2	0	.55	0.	.55	50.00
129 40L CP40	10.00	0	0	0	0.	0.	0.	0.
130 50L CP50	10.00	1	1	0	.28	0.	.28	25.00
131 60L CP60	10.00	0	0	0	0.	0.	0.	0.
132 70L CP70	10.00	0	0	0	0.	0.	0.	0.
133 99L CP99	10.00	0	0	0	0.	0.	0.	0.
134 ????	10.00	0	0	0	0.	0.	0.	0.
135 1111	10.00	0	0	0	0.	0.	0.	0.

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EXHIBIT D-6. LOGIC TREE FOR ANALYZING DAMAGE CENTERLINE  
DISTANCE FROM STERN--HULL RUPTURE

*****										
NODE NAME?			ALL							
NO.	NAME	EVENT	WEIGHT	--P--	--C--	-N/D-	--S1--	--S2--	--PT--	--FP--
1	LEVO	PURT	100.00	227	362	0	100.00	0.	100.00	100.00
2	PAB	PAB	7.14	69	69	0	30.40	0.	30.40	30.40
3	PAB	PAB	7.14	38	38	0	16.74	0.	16.74	16.74
4	PAB	PAB	7.14	10	10	0	4.41	0.	4.41	4.41
5	PAB	PAB	7.14	29	29	0	12.78	0.	12.78	12.78
6	KSB	KSB	7.14	20	20	0	8.81	0.	8.81	8.81
7	KSD	KSD	7.14	13	13	0	5.73	0.	5.73	5.73
8	KES	KES	7.14	25	25	0	11.01	0.	11.01	11.01
9	KED	KED	7.14	9	9	0	3.96	0.	3.96	3.96
10	KEL	KEL	7.14	0	0	0	0.	0.	0.	0.
11	UPC	UPC	7.14	6	6	0	2.64	0.	2.64	2.64
12	LWC	LWC	7.14	4	4	0	1.76	0.	1.76	1.76
13	COM	COM	7.14	3	3	0	1.32	0.	1.32	1.32
14	????		7.14	0	0	0	0.	0.	0.	0.
15	1111		7.14	1	1	0	.44	0.	.44	.44
16	10A	CP10	10.00	24	24	0	10.57	0.	10.57	34.78
17	20A	CP20	10.00	17	17	0	7.49	0.	7.49	24.64
18	30A	CP30	10.00	9	9	0	3.96	0.	3.96	13.04
19	40A	CP40	10.00	7	7	0	3.08	0.	3.08	10.14
20	50A	CP50	10.00	2	2	0	.88	0.	.88	2.90
21	60A	CP60	10.00	1	1	0	.44	0.	.44	1.45
22	70A	CP70	10.00	1	1	0	.44	0.	.44	1.45
23	99A	CP99	10.00	0	0	0	0.	0.	0.	0.
24	????		10.00	0	0	0	0.	0.	0.	0.
25	1111		10.00	8	8	0	3.52	0.	3.52	11.59
26	10B	CP10	10.00	7	7	0	3.08	0.	3.08	18.42
27	20B	CP20	10.00	7	7	0	3.08	0.	3.08	18.42
28	30B	CP30	10.00	7	7	0	3.08	0.	3.08	18.42
29	40B	CP40	10.00	10	10	0	4.41	0.	4.41	26.32
30	50B	CP50	10.00	4	4	0	1.76	0.	1.76	10.53
31	60B	CP60	10.00	0	0	0	0.	0.	0.	0.
32	70B	CP70	10.00	1	1	0	.44	0.	.44	2.63
33	99B	CP99	10.00	1	1	0	.44	0.	.44	2.63
34	????		10.00	0	0	0	0.	0.	0.	0.
35	1111		10.00	1	1	0	.44	0.	.44	2.63
36	10C	CP10	10.00	3	3	0	1.32	0.	1.32	30.00
37	20C	CP20	10.00	2	2	0	.88	0.	.88	20.00
38	30C	CP30	10.00	3	3	0	1.32	0.	1.32	30.00
39	40C	CP40	10.00	1	1	0	.44	0.	.44	10.00
40	50C	CP50	10.00	0	0	0	0.	0.	0.	0.
41	60C	CP60	10.00	0	0	0	0.	0.	0.	0.
42	70C	CP70	10.00	0	0	0	0.	0.	0.	0.
43	99C	CP99	10.00	0	0	0	0.	0.	0.	0.
44	????		10.00	0	0	0	0.	0.	0.	0.
45	1111		10.00	1	1	0	.44	0.	.44	10.00
46	10D	CP10	10.00	2	2	0	.88	0.	.88	6.90
47	20D	CP20	10.00	0	0	0	0.	0.	0.	0.
48	30D	CP30	10.00	0	0	0	0.	0.	0.	0.
49	40D	CP40	10.00	0	0	0	0.	0.	0.	0.
50	50D	CP50	10.00	0	0	0	0.	0.	0.	0.
51	60D	CP60	10.00	0	0	0	0.	0.	0.	0.
52	70D	CP70	10.00	0	0	0	0.	0.	0.	0.
53	99D	CP99	10.00	0	0	0	0.	0.	0.	0.
54	????		10.00	0	0	0	0.	0.	0.	0.
55	1111		10.00	27	27	0	11.89	0.	11.89	93.10
56	10E	CP10	10.00	4	4	0	1.76	0.	1.76	20.00
57	20E	CP20	10.00	5	5	0	2.20	0.	2.20	25.00
58	30E	CP30	10.00	5	5	0	2.20	0.	2.20	25.00
59	40E	CP40	10.00	4	4	0	1.76	0.	1.76	20.00
60	50E	CP50	10.00	2	2	0	.88	0.	.88	10.00
61	60E	CP60	10.00	0	0	0	0.	0.	0.	0.
62	70E	CP70	10.00	0	0	0	0.	0.	0.	0.
63	99E	CP99	10.00	0	0	0	0.	0.	0.	0.
64	????		10.00	0	0	0	0.	0.	0.	0.

## EXHIBIT D-6. (Continued)

65 1111	10.00	0	0	0	0.	0.	0.	0.
66 10F CP10	10.00	2	2	0	.88	0.	.88	15.38
67 20F CP20	10.00	4	4	0	1.76	0.	1.76	30.77
68 30F CP30	10.00	1	1	0	.44	0.	.44	7.69
69 40F CP40	10.00	1	1	0	.44	0.	.44	7.69
70 50F CP50	10.00	2	2	0	.88	0.	.88	15.38
71 60F CP60	10.00	0	0	0	0.	0.	0.	0.
72 70F CP70	10.00	0	0	0	0.	0.	0.	0.
73 99F CP99	10.00	0	0	0	0.	0.	0.	0.
74 1111	10.00	0	0	0	0.	0.	0.	0.
75 1111	10.00	3	3	0	1.32	0.	1.32	23.08
76 10G CP10	10.00	3	3	0	1.32	0.	1.32	12.00
77 20G CP20	10.00	0	0	0	0.	0.	0.	0.
78 30G CP30	10.00	0	0	0	0.	0.	0.	0.
79 40G CP40	10.00	0	0	0	0.	0.	0.	0.
80 50G CP50	10.00	0	0	0	0.	0.	0.	0.
81 60G CP60	10.00	0	0	0	0.	0.	0.	0.
82 70G CP70	10.00	0	0	0	0.	0.	0.	0.
83 99G CP99	10.00	0	0	0	0.	0.	0.	0.
84 1111	10.00	0	0	0	0.	0.	0.	0.
85 1111	10.00	22	22	0	9.69	0.	9.69	83.00
86 10H CP10	10.00	2	2	0	.88	0.	.88	22.22
87 20H CP20	10.00	0	0	0	0.	0.	0.	0.
88 30H CP30	10.00	0	0	0	0.	0.	0.	0.
89 40H CP40	10.00	0	0	0	0.	0.	0.	0.
90 50H CP50	10.00	0	0	0	0.	0.	0.	0.
91 60H CP60	10.00	0	0	0	0.	0.	0.	0.
92 70H CP70	10.00	0	0	0	0.	0.	0.	0.
93 99H CP99	10.00	0	0	0	0.	0.	0.	0.
94 1111	10.00	0	0	0	0.	0.	0.	0.
95 1111	10.00	7	7	0	3.09	0.	3.09	77.78
96 10I CP10	10.00	0	0	0	0.	0.	0.	0.
97 20I CP20	10.00	0	0	0	0.	0.	0.	0.
98 30I CP30	10.00	0	0	0	0.	0.	0.	0.
99 40I CP40	10.00	0	0	0	0.	0.	0.	0.
100 50I CP50	10.00	0	0	0	0.	0.	0.	0.
101 60I CP60	10.00	0	0	0	0.	0.	0.	0.
102 70I CP70	10.00	0	0	0	0.	0.	0.	0.
103 99I CP99	10.00	0	0	0	0.	0.	0.	0.
104 1111	10.00	0	0	0	0.	0.	0.	0.
105 1111	10.00	0	0	0	0.	0.	0.	0.
106 10J CP10	10.00	0	0	0	0.	0.	0.	0.
107 20J CP20	10.00	0	0	0	0.	0.	0.	0.
108 30J CP30	10.00	0	0	0	0.	0.	0.	0.
109 40J CP40	10.00	0	0	0	0.	0.	0.	0.
110 50J CP50	10.00	0	0	0	0.	0.	0.	0.
111 60J CP60	10.00	0	0	0	0.	0.	0.	0.
112 70J CP70	10.00	0	0	0	0.	0.	0.	0.
113 99J CP99	10.00	0	0	0	0.	0.	0.	0.
114 1111	10.00	0	0	0	0.	0.	0.	0.
115 1111	10.00	6	6	0	2.64	0.	2.64	100.00
116 10K CP10	10.00	2	2	0	.88	0.	.88	50.00
117 20K CP20	10.00	0	0	0	0.	0.	0.	0.
118 30K CP30	10.00	0	0	0	0.	0.	0.	0.
119 40K CP40	10.00	0	0	0	0.	0.	0.	0.
120 50K CP50	10.00	0	0	0	0.	0.	0.	0.
121 60K CP60	10.00	0	0	0	0.	0.	0.	0.
122 70K CP70	10.00	0	0	0	0.	0.	0.	0.
123 99K CP99	10.00	0	0	0	0.	0.	0.	0.
124 1111	10.00	0	0	0	0.	0.	0.	0.
125 1111	10.00	2	2	0	.88	0.	.88	50.00
126 10L CP10	10.00	0	0	0	0.	0.	0.	0.

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## EXHIBIT D-6 (Continued)

127	20L	CP20	10.00	1	1	0	.44	0.	.44	33.33
128	30L	CP30	10.00	2	2	0	.88	0.	.88	66.67
129	40L	CP40	10.00	0	0	0	0.	0.	0.	0.
130	50L	CP50	10.00	0	0	0	0.	0.	0.	0.
131	60L	CP60	10.00	0	0	0	0.	0.	0.	0.
132	70L	CP70	10.00	0	0	0	0.	0.	0.	0.
133	99L	CP99	10.00	0	0	0	0.	0.	0.	0.
134	????		10.00	0	0	0	0.	0.	0.	0.
135	1111		10.00	0	0	0	0.	0.	0.	0.

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EXHIBIT D-7. LOGIC TREE FOR ANALYZING DAMAGE CENTERLINE  
DISTANCE FROM STERN--CRACKS/FRACTURES

*****										
NODE NAME?			ALL							
NO.	NAME	EVENT	WEIGHT	--P--	--C--	-N/D-	--S1--	--S2--	--PT--	--FP--
1	LEVO	STEF	100.00	139	436	0	100.00	0.	100.00	100.00
2	PAS	PAS	7.14	51	51	0	36.69	0.	36.69	36.69
3	PAB	PAB	7.14	13	13	0	9.35	0.	9.35	9.35
4	PAD	PAD	7.14	8	8	0	5.76	0.	5.76	5.76
5	PAE	PAE	7.14	16	16	0	11.51	0.	11.51	11.51
6	KSR	KSR	7.14	12	12	0	8.63	0.	8.63	8.63
7	KSD	KSD	7.14	6	6	0	4.32	0.	4.32	4.32
8	KES	KES	7.14	18	18	0	12.95	0.	12.95	12.95
9	KED	KED	7.14	6	6	0	4.32	0.	4.32	4.32
10	KEB	KEB	7.14	0	0	0	0.	0.	0.	0.
11	UPC	UPC	7.14	6	6	0	4.32	0.	4.32	4.32
12	LWC	LWC	7.14	1	1	0	.72	0.	.72	.72
13	COM	COM	7.14	1	1	0	.72	0.	.72	.72
14	????		7.14	0	0	0	0.	0.	0.	0.
15	\$\$\$		7.14	1	1	0	.72	0.	.72	.72
16	10A	CP10	10.00	19	19	0	13.67	0.	13.67	37.25
17	20A	CP20	10.00	9	9	0	6.47	0.	6.47	17.65
18	30A	CP30	10.00	6	6	0	4.32	0.	4.32	11.76
19	40A	CP40	10.00	5	5	0	3.60	0.	3.60	9.80
20	50A	CP50	10.00	2	2	0	1.44	0.	1.44	3.92
21	60A	CP60	10.00	1	1	0	.72	0.	.72	1.96
22	70A	CP70	10.00	1	1	0	.72	0.	.72	1.96
23	99A	CP99	10.00	0	0	0	0.	0.	0.	0.
24	????		10.00	0	0	0	0.	0.	0.	0.
25	\$\$\$		10.00	8	8	0	5.76	0.	5.76	15.69
26	10B	CP10	10.00	1	1	0	.72	0.	.72	7.69
27	20B	CP20	10.00	3	3	0	2.16	0.	2.16	23.08
28	30B	CP30	10.00	4	4	0	2.88	0.	2.88	30.77
29	40B	CP40	10.00	5	5	0	3.60	0.	3.60	38.46
30	50B	CP50	10.00	0	0	0	0.	0.	0.	0.
31	60B	CP60	10.00	0	0	0	0.	0.	0.	0.
32	70B	CP70	10.00	0	0	0	0.	0.	0.	0.
33	99B	CP99	10.00	0	0	0	0.	0.	0.	0.
34	????		10.00	0	0	0	0.	0.	0.	0.
35	\$\$\$		10.00	0	0	0	0.	0.	0.	0.
36	10C	CP10	10.00	3	3	0	2.16	0.	2.16	37.50
37	20C	CP20	10.00	2	2	0	1.44	0.	1.44	25.00
38	30C	CP30	10.00	2	2	0	1.44	0.	1.44	25.00
39	40C	CP40	10.00	0	0	0	0.	0.	0.	0.
40	50C	CP50	10.00	0	0	0	0.	0.	0.	0.
41	60C	CP60	10.00	0	0	0	0.	0.	0.	0.
42	70C	CP70	10.00	0	0	0	0.	0.	0.	0.
43	99C	CP99	10.00	0	0	0	0.	0.	0.	0.
44	????		10.00	0	0	0	0.	0.	0.	0.
45	\$\$\$		10.00	1	1	0	.72	0.	.72	12.50
46	10D	CP10	10.00	1	1	0	.72	0.	.72	6.25
47	20D	CP20	10.00	0	0	0	0.	0.	0.	0.
48	30D	CP30	10.00	0	0	0	0.	0.	0.	0.
49	40D	CP40	10.00	0	0	0	0.	0.	0.	0.
50	50D	CP50	10.00	0	0	0	0.	0.	0.	0.
51	60D	CP60	10.00	0	0	0	0.	0.	0.	0.
52	70D	CP70	10.00	0	0	0	0.	0.	0.	0.
53	99D	CP99	10.00	0	0	0	0.	0.	0.	0.
54	????		10.00	0	0	0	0.	0.	0.	0.
55	\$\$\$		10.00	15	15	0	10.79	0.	10.79	93.75
56	10E	CP10	10.00	3	3	0	2.16	0.	2.16	25.00
57	20E	CP20	10.00	2	2	0	1.44	0.	1.44	16.67
58	30E	CP30	10.00	3	3	0	2.16	0.	2.16	25.00
59	40E	CP40	10.00	2	2	0	1.44	0.	1.44	16.67
60	50E	CP50	10.00	2	2	0	1.44	0.	1.44	16.67
61	60E	CP60	10.00	0	0	0	0.	0.	0.	0.
62	70E	CP70	10.00	0	0	0	0.	0.	0.	0.
63	99E	CP99	10.00	0	0	0	0.	0.	0.	0.
64	????		10.00	0	0	0	0.	0.	0.	0.
65	\$\$\$		10.00	0	0	0	0.	0.	0.	0.

## EXHIBIT D-7. (Continued)

66	10F	CP10	10.00	1	1	0	.72	0.	.72	16.67
67	20F	CP20	10.00	1	1	0	.72	0.	.72	16.67
68	30F	CP30	10.00	0	0	0	0.	0.	0.	0.
69	40F	CP40	10.00	0	0	0	0.	0.	0.	0.
70	50F	CP50	10.00	2	2	0	1.44	0.	1.44	33.33
71	60F	CP60	10.00	0	0	0	0.	0.	0.	0.
72	70F	CP70	10.00	0	0	0	0.	0.	0.	0.
73	99F	CP99	10.00	0	0	0	0.	0.	0.	0.
74	????		10.00	0	0	0	0.	0.	0.	0.
75	1111		10.00	2	2	0	1.44	0.	1.44	33.33
76	10G	CP10	10.00	1	1	0	.72	0.	.72	5.56
77	20G	CP20	10.00	0	0	0	0.	0.	0.	0.
78	30G	CP30	10.00	0	0	0	0.	0.	0.	0.
79	40G	CP40	10.00	0	0	0	0.	0.	0.	0.
80	50G	CP50	10.00	0	0	0	0.	0.	0.	0.
81	60G	CP60	10.00	0	0	0	0.	0.	0.	0.
82	70G	CP70	10.00	0	0	0	0.	0.	0.	0.
83	99G	CP99	10.00	0	0	0	0.	0.	0.	0.
84	????		10.00	0	0	0	0.	0.	0.	0.
85	1111		10.00	17	17	0	12.23	0.	12.23	94.44
86	10H	CP10	10.00	1	1	0	.72	0.	.72	16.67
87	20H	CP20	10.00	0	0	0	0.	0.	0.	0.
88	30H	CP30	10.00	0	0	0	0.	0.	0.	0.
89	40H	CP40	10.00	0	0	0	0.	0.	0.	0.
90	50H	CP50	10.00	0	0	0	0.	0.	0.	0.
91	60H	CP60	10.00	0	0	0	0.	0.	0.	0.
92	70H	CP70	10.00	0	0	0	0.	0.	0.	0.
93	99H	CP99	10.00	0	0	0	0.	0.	0.	0.
94	????		10.00	0	0	0	0.	0.	0.	0.
95	1111		10.00	5	5	0	3.60	0.	3.60	83.33
96	10I	CP10	10.00	0	0	0	0.	0.	0.	0.
97	20I	CP20	10.00	0	0	0	0.	0.	0.	0.
98	30I	CP30	10.00	0	0	0	0.	0.	0.	0.
99	40I	CP40	10.00	0	0	0	0.	0.	0.	0.
100	50I	CP50	10.00	0	0	0	0.	0.	0.	0.
101	60I	CP60	10.00	0	0	0	0.	0.	0.	0.
102	70I	CP70	10.00	0	0	0	0.	0.	0.	0.
103	99I	CP99	10.00	0	0	0	0.	0.	0.	0.
104	????		10.00	0	0	0	0.	0.	0.	0.
105	1111		10.00	0	0	0	0.	0.	0.	0.
106	10J	CP10	10.00	0	0	0	0.	0.	0.	0.
107	20J	CP20	10.00	0	0	0	0.	0.	0.	0.
108	30J	CP30	10.00	0	0	0	0.	0.	0.	0.
109	40J	CP40	10.00	0	0	0	0.	0.	0.	0.
110	50J	CP50	10.00	0	0	0	0.	0.	0.	0.
111	60J	CP60	10.00	0	0	0	0.	0.	0.	0.
112	70J	CP70	10.00	0	0	0	0.	0.	0.	0.
113	99J	CP99	10.00	0	0	0	0.	0.	0.	0.
114	????		10.00	0	0	0	0.	0.	0.	0.
115	1111		10.00	6	6	0	4.32	0.	4.32	100.00
116	10K	CP10	10.00	0	0	0	0.	0.	0.	0.
117	20K	CP20	10.00	0	0	0	0.	0.	0.	0.
118	30K	CP30	10.00	0	0	0	0.	0.	0.	0.
119	40K	CP40	10.00	0	0	0	0.	0.	0.	0.
120	50K	CP50	10.00	0	0	0	0.	0.	0.	0.
121	60K	CP60	10.00	0	0	0	0.	0.	0.	0.
122	70K	CP70	10.00	0	0	0	0.	0.	0.	0.
123	99K	CP99	10.00	0	0	0	0.	0.	0.	0.
124	????		10.00	0	0	0	0.	0.	0.	0.
125	1111		10.00	1	1	0	.72	0.	.72	100.00
126	10L	CP10	10.00	0	0	0	0.	0.	0.	0.
127	20L	CP20	10.00	1	1	0	.72	0.	.72	100.00
128	30L	CP30	10.00	0	0	0	0.	0.	0.	0.
129	40L	CP40	10.00	0	0	0	0.	0.	0.	0.
130	50L	CP50	10.00	0	0	0	0.	0.	0.	0.
131	60L	CP60	10.00	0	0	0	0.	0.	0.	0.
132	70L	CP70	10.00	0	0	0	0.	0.	0.	0.
133	99L	CP99	10.00	0	0	0	0.	0.	0.	0.
134	????		10.00	0	0	0	0.	0.	0.	0.
135	1111		10.00	0	0	0	0.	0.	0.	0.

EXHIBIT D-8. LOGIC TREE FOR ANALYZING DAMAGE CENTERLINE  
DISTANCE FROM STERN--HOLES

*****											
NODE NAME ?			ALL								
NO.	NAME	EVENT	WEIGHT	--P--	--C--	-N/D-	--S1--	--S2--	--PT--	--PP--	
1	LEVO	STOP	100.00	87	347	0	100.00	0.	100.00	100.00	
2	PAB	PAB	7.14	21	21	0	24.14	0.	24.14	24.14	
3	PAB	PAB	7.14	20	20	0	22.99	0.	22.99	22.99	
4	PAB	PAB	7.14	3	3	0	3.45	0.	3.45	3.45	
5	PAB	PAB	7.14	12	12	0	13.79	0.	13.79	13.79	
6	KSB	KSB	7.14	8	8	0	9.20	0.	9.20	9.20	
7	KSD	KSD	7.14	6	6	0	6.90	0.	6.90	6.90	
8	KES	KES	7.14	7	7	0	8.05	0.	8.05	8.05	
9	KED	KED	7.14	3	3	0	3.45	0.	3.45	3.45	
10	KEB	KEB	7.14	0	0	0	0.	0.	0.	0.	
11	UPC	UPC	7.14	1	1	0	1.15	0.	1.15	1.15	
12	LWC	LWC	7.14	3	3	0	3.45	0.	3.45	3.45	
13	COM	COM	7.14	2	2	0	2.30	0.	2.30	2.30	
14	????		7.14	0	0	0	0.	0.	0.	0.	
15	1111		7.14	1	1	0	1.15	0.	1.15	1.15	
16	10A	CP10	10.00	6	6	0	6.90	0.	6.90	28.57	
17	20A	CP20	10.00	9	9	0	10.34	0.	10.34	42.86	
18	30A	CP30	10.00	3	3	0	3.45	0.	3.45	14.29	
19	40A	CP40	10.00	3	3	0	3.45	0.	3.45	14.29	
20	50A	CP50	10.00	0	0	0	0.	0.	0.	0.	
21	60A	CP60	10.00	0	0	0	0.	0.	0.	0.	
22	70A	CP70	10.00	0	0	0	0.	0.	0.	0.	
23	99A	CP99	10.00	0	0	0	0.	0.	0.	0.	
24	????		10.00	0	0	0	0.	0.	0.	0.	
25	1111		10.00	0	0	0	0.	0.	0.	0.	
26	10B	CP10	10.00	6	6	0	6.90	0.	6.90	30.00	
27	20B	CP20	10.00	4	4	0	4.60	0.	4.60	20.00	
28	30B	CP30	10.00	2	2	0	2.30	0.	2.30	10.00	
29	40B	CP40	10.00	4	4	0	4.60	0.	4.60	20.00	
30	50B	CP50	10.00	3	3	0	3.45	0.	3.45	15.00	
31	60B	CP60	10.00	0	0	0	0.	0.	0.	0.	
32	70B	CP70	10.00	0	0	0	0.	0.	0.	0.	
33	99B	CP99	10.00	0	0	0	0.	0.	0.	0.	
34	????		10.00	0	0	0	0.	0.	0.	0.	
35	1111		10.00	1	1	0	1.15	0.	1.15	5.00	
36	10C	CP10	10.00	0	0	0	0.	0.	0.	0.	
37	20C	CP20	10.00	1	1	0	1.15	0.	1.15	33.33	
38	30C	CP30	10.00	1	1	0	1.15	0.	1.15	33.33	
39	40C	CP40	10.00	1	1	0	1.15	0.	1.15	33.33	
40	50C	CP50	10.00	0	0	0	0.	0.	0.	0.	
41	60C	CP60	10.00	0	0	0	0.	0.	0.	0.	
42	70C	CP70	10.00	0	0	0	0.	0.	0.	0.	
43	99C	CP99	10.00	0	0	0	0.	0.	0.	0.	
44	????		10.00	0	0	0	0.	0.	0.	0.	
45	1111		10.00	0	0	0	0.	0.	0.	0.	
46	10D	CP10	10.00	1	1	0	1.15	0.	1.15	8.33	
47	20D	CP20	10.00	0	0	0	0.	0.	0.	0.	
48	30D	CP30	10.00	0	0	0	0.	0.	0.	0.	
49	40D	CP40	10.00	0	0	0	0.	0.	0.	0.	
50	50D	CP50	10.00	0	0	0	0.	0.	0.	0.	
51	60D	CP60	10.00	0	0	0	0.	0.	0.	0.	
52	70D	CP70	10.00	0	0	0	0.	0.	0.	0.	
53	99D	CP99	10.00	0	0	0	0.	0.	0.	0.	
54	????		10.00	0	0	0	0.	0.	0.	0.	
55	1111		10.00	11	11	0	12.64	0.	12.64	91.67	
56	10E	CP10	10.00	2	2	0	2.30	0.	2.30	25.00	
57	20E	CP20	10.00	2	2	0	2.30	0.	2.30	25.00	
58	30E	CP30	10.00	2	2	0	2.30	0.	2.30	25.00	
59	40E	CP40	10.00	2	2	0	2.30	0.	2.30	25.00	
60	50E	CP50	10.00	0	0	0	0.	0.	0.	0.	
61	60E	CP60	10.00	0	0	0	0.	0.	0.	0.	
62	70E	CP70	10.00	0	0	0	0.	0.	0.	0.	
63	99E	CP99	10.00	0	0	0	0.	0.	0.	0.	
64	????		10.00	0	0	0	0.	0.	0.	0.	
65	1111		10.00	0	0	0	0.	0.	0.	0.	

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## EXHIBIT D-8. (Continued)

66	10F	CP10	10.00	1	1	0	1.15	0.	1.15	16.67
67	20F	CP20	10.00	3	3	0	3.45	0.	3.45	50.00
68	30F	CP30	10.00	0	0	0	0.	0.	0.	0.
69	40F	CP40	10.00	1	1	0	1.15	0.	1.15	16.67
70	50F	CP50	10.00	0	0	0	0.	0.	0.	0.
71	60F	CP60	10.00	0	0	0	0.	0.	0.	0.
72	70F	CP70	10.00	0	0	0	0.	0.	0.	0.
73	99F	CP99	10.00	0	0	0	0.	0.	0.	0.
74	????		10.00	0	0	0	0.	0.	0.	0.
75	1111		10.00	1	1	0	1.15	0.	1.15	16.67
76	105	CP10	10.00	2	2	0	2.30	0.	2.30	28.57
77	205	CP20	10.00	0	0	0	0.	0.	0.	0.
78	305	CP30	10.00	0	0	0	0.	0.	0.	0.
79	405	CP40	10.00	0	0	0	0.	0.	0.	0.
80	505	CP50	10.00	0	0	0	0.	0.	0.	0.
81	605	CP60	10.00	0	0	0	0.	0.	0.	0.
82	705	CP70	10.00	0	0	0	0.	0.	0.	0.
83	995	CP99	10.00	0	0	0	0.	0.	0.	0.
84	????		10.00	0	0	0	0.	0.	0.	0.
85	1111		10.00	5	5	0	5.75	0.	5.75	71.43
86	10H	CP10	10.00	1	1	0	1.15	0.	1.15	33.33
87	20H	CP20	10.00	0	0	0	0.	0.	0.	0.
88	30H	CP30	10.00	0	0	0	0.	0.	0.	0.
89	40H	CP40	10.00	0	0	0	0.	0.	0.	0.
90	50H	CP50	10.00	0	0	0	0.	0.	0.	0.
91	60H	CP60	10.00	0	0	0	0.	0.	0.	0.
92	70H	CP70	10.00	0	0	0	0.	0.	0.	0.
93	99H	CP99	10.00	0	0	0	0.	0.	0.	0.
94	????		10.00	0	0	0	0.	0.	0.	0.
95	1111		10.00	2	2	0	2.30	0.	2.30	66.67
96	10I	CP10	10.00	0	0	0	0.	0.	0.	0.
97	20I	CP20	10.00	0	0	0	0.	0.	0.	0.
98	30I	CP30	10.00	0	0	0	0.	0.	0.	0.
99	40I	CP40	10.00	0	0	0	0.	0.	0.	0.
100	50I	CP50	10.00	0	0	0	0.	0.	0.	0.
101	60I	CP60	10.00	0	0	0	0.	0.	0.	0.
102	70I	CP70	10.00	0	0	0	0.	0.	0.	0.
103	99I	CP99	10.00	0	0	0	0.	0.	0.	0.
104	????		10.00	0	0	0	0.	0.	0.	0.
105	1111		10.00	0	0	0	0.	0.	0.	0.
106	10J	CP10	10.00	0	0	0	0.	0.	0.	0.
107	20J	CP20	10.00	0	0	0	0.	0.	0.	0.
108	30J	CP30	10.00	0	0	0	0.	0.	0.	0.
109	40J	CP40	10.00	0	0	0	0.	0.	0.	0.
110	50J	CP50	10.00	0	0	0	0.	0.	0.	0.
111	60J	CP60	10.00	0	0	0	0.	0.	0.	0.
112	70J	CP70	10.00	0	0	0	0.	0.	0.	0.
113	99J	CP99	10.00	0	0	0	0.	0.	0.	0.
114	????		10.00	0	0	0	0.	0.	0.	0.
115	1111		10.00	1	1	0	1.15	0.	1.15	100.00
116	10K	CP10	10.00	2	2	0	2.30	0.	2.30	66.67
117	20K	CP20	10.00	0	0	0	0.	0.	0.	0.
118	30K	CP30	10.00	0	0	0	0.	0.	0.	0.
119	40K	CP40	10.00	0	0	0	0.	0.	0.	0.
120	50K	CP50	10.00	0	0	0	0.	0.	0.	0.
121	60K	CP60	10.00	0	0	0	0.	0.	0.	0.
122	70K	CP70	10.00	0	0	0	0.	0.	0.	0.
123	99K	CP99	10.00	0	0	0	0.	0.	0.	0.
124	????		10.00	0	0	0	0.	0.	0.	0.
125	1111		10.00	1	1	0	1.15	0.	1.15	33.33
126	10L	CP10	10.00	0	0	0	0.	0.	0.	0.
127	20L	CP20	10.00	0	0	0	0.	0.	0.	0.
128	30L	CP30	10.00	2	2	0	2.30	0.	2.30	100.00
129	40L	CP40	10.00	0	0	0	0.	0.	0.	0.
130	50L	CP50	10.00	0	0	0	0.	0.	0.	0.
131	60L	CP60	10.00	0	0	0	0.	0.	0.	0.
132	70L	CP70	10.00	0	0	0	0.	0.	0.	0.
133	99L	CP99	10.00	0	0	0	0.	0.	0.	0.
134	????		10.00	0	0	0	0.	0.	0.	0.
135	1111		10.00	0	0	0	0.	0.	0.	0.

EXHIBIT D-9. LOGIC TREE FOR ANALYZING FREQUENCY OF SIDE HULL  
RUPTURE IN LONGITUDINAL AND VERTICAL MATRIX

*****											
NODE NAME?			ALL								
NO.	NAME	EVENT	WEIGHT	--F--	--C--	-N/D-	--S1--	--S2--	--PT--	--PP--	
1	LEVO	PAC	100.00	238	757	0	100.00	0.	100.00	100.00	
2	EDM	EDM1	25.00	157	157	0	65.97	0.	65.97	65.97	
3	STEP	STEP	25.00	69	69	0	28.99	0.	28.99	28.99	
4	????		25.00	0	0	0	0.	0.	0.	0.	
5	1111		25.00	12	12	0	5.04	0.	5.04	5.04	
6	B10	CP10	10.00	57	57	0	23.95	0.	23.95	36.31	
7	B20	CP20	10.00	28	28	0	11.76	0.	11.76	17.83	
8	B30	CP30	10.00	28	28	0	11.76	0.	11.76	17.83	
9	B40	CP40	10.00	12	12	0	5.04	0.	5.04	7.64	
10	B50	CP50	10.00	15	15	0	6.30	0.	6.30	9.55	
11	B60	CP60	10.00	8	8	0	3.36	0.	3.36	5.10	
12	B70	CP70	10.00	2	2	0	.84	0.	.84	1.27	
13	B99	CP99	10.00	1	1	0	.42	0.	.42	.64	
14	????		10.00	0	0	0	0.	0.	0.	0.	
15	1111		10.00	6	6	0	2.52	0.	2.52	3.82	
16	S10	CP10	10.00	24	24	0	10.08	0.	10.08	34.78	
17	S20	CP20	10.00	17	17	0	7.14	0.	7.14	24.64	
18	S30	CP30	10.00	9	9	0	3.78	0.	3.78	13.04	
19	S40	CP40	10.00	7	7	0	2.94	0.	2.94	10.14	
20	S50	CP50	10.00	2	2	0	.84	0.	.84	2.90	
21	S60	CP60	10.00	1	1	0	.42	0.	.42	1.45	
22	S70	CP70	10.00	1	1	0	.42	0.	.42	1.45	
23	S99	CP99	10.00	0	0	0	0.	0.	0.	0.	
24	????		10.00	0	0	0	0.	0.	0.	0.	
25	1111		10.00	8	8	0	3.36	0.	3.36	11.59	
26	25A	V25	14.29	7	7	0	2.94	0.	2.94	12.28	
27	50A	V50	14.29	15	15	0	6.30	0.	6.30	26.32	
28	75A	V75	14.29	11	11	0	4.62	0.	4.62	19.30	
29	100A	V100	14.29	13	13	0	5.46	0.	5.46	22.81	
30	500A	V500	14.29	8	8	0	3.36	0.	3.36	14.04	
31	????		14.29	0	0	0	0.	0.	0.	0.	
32	1111		14.29	3	3	0	1.26	0.	1.26	5.26	
33	25B	V25	14.29	6	6	0	2.52	0.	2.52	21.43	
34	50B	V50	14.29	6	6	0	2.52	0.	2.52	21.43	
35	75B	V75	14.29	4	4	0	1.68	0.	1.68	14.29	
36	100B	V100	14.29	4	4	0	1.68	0.	1.68	14.29	
37	500B	V500	14.29	8	8	0	3.36	0.	3.36	28.57	
38	????		14.29	0	0	0	0.	0.	0.	0.	
39	1111		14.29	0	0	0	0.	0.	0.	0.	
40	25C	V25	14.29	2	2	0	.84	0.	.84	7.14	
41	50C	V50	14.29	6	6	0	2.52	0.	2.52	21.43	
42	75C	V75	14.29	6	6	0	2.52	0.	2.52	21.43	
43	100C	V100	14.29	7	7	0	2.94	0.	2.94	25.00	
44	500C	V500	14.29	7	7	0	2.94	0.	2.94	25.00	
45	????		14.29	0	0	0	0.	0.	0.	0.	
46	1111		14.29	0	0	0	0.	0.	0.	0.	
47	25D	V25	14.29	2	2	0	.84	0.	.84	16.67	
48	50D	V50	14.29	2	2	0	.84	0.	.84	16.67	
49	75D	V75	14.29	3	3	0	1.26	0.	1.26	25.00	
50	100D	V100	14.29	2	2	0	.84	0.	.84	16.67	
51	500D	V500	14.29	3	3	0	1.26	0.	1.26	25.00	
52	????		14.29	0	0	0	0.	0.	0.	0.	
53	1111		14.29	0	0	0	0.	0.	0.	0.	
54	25E	V25	14.29	4	4	0	1.68	0.	1.68	26.67	
55	50E	V50	14.29	1	1	0	.42	0.	.42	6.67	
56	75E	V75	14.29	4	4	0	1.68	0.	1.68	26.67	
57	100E	V100	14.29	6	6	0	2.52	0.	2.52	40.00	
58	500E	V500	14.29	0	0	0	0.	0.	0.	0.	
59	????		14.29	0	0	0	0.	0.	0.	0.	
60	1111		14.29	0	0	0	0.	0.	0.	0.	
61	25F	V25	14.29	0	0	0	0.	0.	0.	0.	
62	50F	V50	14.29	3	3	0	1.26	0.	1.26	37.50	
63	75F	V75	14.29	2	2	0	.84	0.	.84	25.00	
64	100F	V100	14.29	2	2	0	.84	0.	.84	25.00	
65	500F	V500	14.29	0	0	0	0.	0.	0.	0.	
66	????		14.29	0	0	0	0.	0.	0.	0.	

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## EXHIBIT D-9. (Continued)

67	1111	14.29	1	1	0	.42	0.	.42	12.50
68	25G V25	14.29	0	0	0	0.	0.	0.	0.
69	50G V50	14.29	0	0	0	0.	0.	0.	0.
70	75G V75	14.29	0	0	0	0.	0.	0.	0.
71	100G V100	14.29	1	1	0	.42	0.	.42	50.00
72	500G V500	14.29	1	1	0	.42	0.	.42	50.00
73	???	14.29	0	0	0	0.	0.	0.	0.
74	1111	14.29	0	0	0	0.	0.	0.	0.
75	25H V25	14.29	0	0	0	0.	0.	0.	0.
76	50H V50	14.29	0	0	0	0.	0.	0.	0.
77	75H V75	14.29	0	0	0	0.	0.	0.	0.
78	100H V100	14.29	1	1	0	.42	0.	.42	100.00
79	500H V500	14.29	0	0	0	0.	0.	0.	0.
80	???	14.29	0	0	0	0.	0.	0.	0.
81	1111	14.29	0	0	0	0.	0.	0.	0.
82	25I V25	14.29	3	3	0	1.26	0.	1.26	12.50
83	50I V50	14.29	7	7	0	2.94	0.	2.94	29.17
84	75I V75	14.29	7	7	0	2.94	0.	2.94	29.17
85	100I V100	14.29	2	2	0	.84	0.	.84	8.33
86	500I V500	14.29	5	5	0	2.10	0.	2.10	20.83
87	???	14.29	0	0	0	0.	0.	0.	0.
88	1111	14.29	0	0	0	0.	0.	0.	0.
89	25J V25	14.29	2	2	0	.84	0.	.84	11.76
90	50J V50	14.29	2	2	0	.84	0.	.84	11.76
91	75J V75	14.29	5	5	0	2.10	0.	2.10	29.41
92	100J V100	14.29	6	6	0	2.52	0.	2.52	35.29
93	500J V500	14.29	2	2	0	.84	0.	.84	11.76
94	???	14.29	0	0	0	0.	0.	0.	0.
95	1111	14.29	0	0	0	0.	0.	0.	0.
96	25K V25	14.29	0	0	0	0.	0.	0.	0.
97	50K V50	14.29	3	3	0	1.26	0.	1.26	33.33
98	75K V75	14.29	2	2	0	.84	0.	.84	22.22
99	100K V100	14.29	1	1	0	.42	0.	.42	11.11
100	500K V500	14.29	3	3	0	1.26	0.	1.26	33.33
101	???	14.29	0	0	0	0.	0.	0.	0.
102	1111	14.29	0	0	0	0.	0.	0.	0.
103	25L V25	14.29	2	2	0	.84	0.	.84	28.57
104	50L V50	14.29	2	2	0	.84	0.	.84	28.57
105	75L V75	14.29	1	1	0	.42	0.	.42	14.29
106	100L V100	14.29	0	0	0	0.	0.	0.	0.
107	500L V500	14.29	2	2	0	.84	0.	.84	28.57
108	???	14.29	0	0	0	0.	0.	0.	0.
109	1111	14.29	0	0	0	0.	0.	0.	0.
110	25M V25	14.29	1	1	0	.42	0.	.42	50.00
111	50M V50	14.29	0	0	0	0.	0.	0.	0.
112	75M V75	14.29	0	0	0	0.	0.	0.	0.
113	100M V100	14.29	0	0	0	0.	0.	0.	0.
114	500M V500	14.29	1	1	0	.42	0.	.42	50.00
115	???	14.29	0	0	0	0.	0.	0.	0.
116	1111	14.29	0	0	0	0.	0.	0.	0.
117	25N V25	14.29	0	0	0	0.	0.	0.	0.
118	50N V50	14.29	0	0	0	0.	0.	0.	0.
119	75N V75	14.29	0	0	0	0.	0.	0.	0.
120	100N V100	14.29	0	0	0	0.	0.	0.	0.
121	500N V500	14.29	1	1	0	.42	0.	.42	100.00
122	???	14.29	0	0	0	0.	0.	0.	0.
123	1111	14.29	0	0	0	0.	0.	0.	0.
124	25O V25	14.29	0	0	0	0.	0.	0.	0.
125	50O V50	14.29	0	0	0	0.	0.	0.	0.
126	75O V75	14.29	0	0	0	0.	0.	0.	0.
127	100O V100	14.29	0	0	0	0.	0.	0.	0.
128	500O V500	14.29	1	1	0	.42	0.	.42	100.00
129	???	14.29	0	0	0	0.	0.	0.	0.
130	1111	14.29	0	0	0	0.	0.	0.	0.
131	25P V25	14.29	0	0	0	0.	0.	0.	0.
132	50P V50	14.29	0	0	0	0.	0.	0.	0.
133	75P V75	14.29	0	0	0	0.	0.	0.	0.
134	100P V100	14.29	0	0	0	0.	0.	0.	0.
135	500P V500	14.29	0	0	0	0.	0.	0.	0.
136	???	14.29	0	0	0	0.	0.	0.	0.
137	1111	14.29	0	0	0	0.	0.	0.	0.

**EXHIBIT D-10. LOGIC TREE FOR ANALYZING FREQUENCY OF SIDE  
CRACKS IN LONGITUDINAL AND VERTICAL MATRIX**

*****										
NO.	NAME	EVENT	WEIGHT	ALL						
				--R--	--C--	--N/D--	--S1--	--S2--	--PT--	--PP--
1	LEVO	PAS	100.00	159	436	0	100.00	0.	100.00	100.00
2	BDM	BDM1	25.00	101	101	0	63.52	0.	63.52	63.52
3	STPN	STER	25.00	51	51	0	32.08	0.	32.08	32.08
4	????		25.00	0	0	0	0.	0.	0.	0.
5	\$\$\$		25.00	7	7	0	4.40	0.	4.40	4.40
6	B10	CP10	10.00	35	35	0	22.01	0.	22.01	34.65
7	B20	CP20	10.00	20	20	0	12.58	0.	12.58	19.80
8	B30	CP30	10.00	15	15	0	9.43	0.	9.43	14.85
9	B40	CP40	10.00	8	8	0	5.03	0.	5.03	7.92
10	B50	CP50	10.00	9	9	0	5.66	0.	5.66	8.91
11	B60	CP60	10.00	7	7	0	4.40	0.	4.40	6.93
12	B70	CP70	10.00	1	1	0	.63	0.	.63	.99
13	B99	CP99	10.00	1	1	0	.63	0.	.63	.99
14	????		10.00	0	0	0	0.	0.	0.	0.
15	\$\$\$		10.00	5	5	0	3.14	0.	3.14	4.95
16	S10	CP10	10.00	19	19	0	11.95	0.	11.95	37.25
17	S20	CP20	10.00	9	9	0	5.66	0.	5.66	17.65
18	S30	CP30	10.00	6	6	0	3.77	0.	3.77	11.76
19	S40	CP40	10.00	5	5	0	3.14	0.	3.14	9.80
20	S50	CP50	10.00	2	2	0	1.26	0.	1.26	3.92
21	S60	CP60	10.00	1	1	0	.63	0.	.63	1.96
22	S70	CP70	10.00	1	1	0	.63	0.	.63	1.96
23	S99	CP99	10.00	0	0	0	0.	0.	0.	0.
24	????		10.00	0	0	0	0.	0.	0.	0.
25	\$\$\$		10.00	8	8	0	5.03	0.	5.03	15.69
26	25A	V25	14.29	3	3	0	1.89	0.	1.89	8.57
27	50A	V50	14.29	9	9	0	5.66	0.	5.66	25.71
28	75A	V75	14.29	6	6	0	3.77	0.	3.77	17.14
29	100A	V100	14.29	9	9	0	5.66	0.	5.66	25.71
30	500A	V500	14.29	6	6	0	3.77	0.	3.77	17.14
31	????		14.29	0	0	0	0.	0.	0.	0.
32	\$\$\$		14.29	2	2	0	1.26	0.	1.26	5.71
33	25B	V25	14.29	4	4	0	2.52	0.	2.52	20.00
34	50B	V50	14.29	3	3	0	1.89	0.	1.89	15.00
35	75B	V75	14.29	3	3	0	1.89	0.	1.89	15.00
36	100B	V100	14.29	2	2	0	1.26	0.	1.26	10.00
37	500B	V500	14.29	8	8	0	5.03	0.	5.03	40.00
38	????		14.29	0	0	0	0.	0.	0.	0.
39	\$\$\$		14.29	0	0	0	0.	0.	0.	0.
40	25C	V25	14.29	2	2	0	1.26	0.	1.26	13.33
41	50C	V50	14.29	3	3	0	1.89	0.	1.89	20.00
42	75C	V75	14.29	3	3	0	1.89	0.	1.89	20.00
43	100C	V100	14.29	3	3	0	1.89	0.	1.89	20.00
44	500C	V500	14.29	4	4	0	2.52	0.	2.52	26.67
45	????		14.29	0	0	0	0.	0.	0.	0.
46	\$\$\$		14.29	0	0	0	0.	0.	0.	0.
47	25D	V25	14.29	1	1	0	.63	0.	.63	12.50
48	50D	V50	14.29	1	1	0	.63	0.	.63	12.50
49	75D	V75	14.29	2	2	0	1.26	0.	1.26	25.00
50	100D	V100	14.29	2	2	0	1.26	0.	1.26	25.00
51	500D	V500	14.29	2	2	0	1.26	0.	1.26	25.00
52	????		14.29	0	0	0	0.	0.	0.	0.
53	\$\$\$		14.29	0	0	0	0.	0.	0.	0.
54	25E	V25	14.29	0	0	0	0.	0.	0.	0.
55	50E	V50	14.29	0	0	0	0.	0.	0.	0.
56	75E	V75	14.29	0	0	0	0.	0.	0.	0.
57	100E	V100	14.29	3	3	0	1.89	0.	1.89	33.33
58	500E	V500	14.29	6	6	0	3.77	0.	3.77	66.67
59	????		14.29	0	0	0	0.	0.	0.	0.
60	\$\$\$		14.29	0	0	0	0.	0.	0.	0.
61	25F	V25	14.29	0	0	0	0.	0.	0.	0.
62	50F	V50	14.29	2	2	0	1.26	0.	1.26	28.57
63	75F	V75	14.29	2	2	0	1.26	0.	1.26	28.57
64	100F	V100	14.29	2	2	0	1.26	0.	1.26	28.57
65	500F	V500	14.29	0	0	0	0.	0.	0.	0.
66	????		14.29	0	0	0	0.	0.	0.	0.
67	\$\$\$		14.29	1	1	0	.63	0.	.63	14.29

## EXHIBIT D-10.(Continued)

68	25G	V25	14.29	0	0	0	0.	0.	0.	0.
69	50G	V50	14.29	0	0	0	0.	0.	0.	0.
70	75G	V75	14.29	0	0	0	0.	0.	0.	0.
71	100G	V100	14.29	0	0	0	0.	0.	0.	0.
72	500G	V500	14.29	1	1	0	.63	0.	.63	100.00
73	????		14.29	0	0	0	0.	0.	0.	0.
74	\$\$\$		14.29	0	0	0	0.	0.	0.	0.
75	25H	V25	14.29	0	0	0	0.	0.	0.	0.
76	50H	V50	14.29	0	0	0	0.	0.	0.	0.
77	75H	V75	14.29	0	0	0	0.	0.	0.	0.
78	100H	V100	14.29	1	1	0	.63	0.	.63	100.00
79	500H	V500	14.29	0	0	0	0.	0.	0.	0.
80	????		14.29	0	0	0	0.	0.	0.	0.
81	\$\$\$		14.29	0	0	0	0.	0.	0.	0.
82	25I	V25	14.29	3	3	0	1.89	0.	1.89	15.79
83	50I	V50	14.29	4	4	0	2.52	0.	2.52	21.05
84	75I	V75	14.29	5	5	0	3.14	0.	3.14	26.32
85	100I	V100	14.29	2	2	0	1.26	0.	1.26	10.53
86	500I	V500	14.29	5	5	0	3.14	0.	3.14	26.32
87	????		14.29	0	0	0	0.	0.	0.	0.
88	\$\$\$		14.29	0	0	0	0.	0.	0.	0.
89	25J	V25	14.29	1	1	0	.63	0.	.63	11.11
90	50J	V50	14.29	0	0	0	0.	0.	0.	0.
91	75J	V75	14.29	4	4	0	2.52	0.	2.52	44.44
92	100J	V100	14.29	3	3	0	1.89	0.	1.89	33.33
93	500J	V500	14.29	1	1	0	.63	0.	.63	11.11
94	????		14.29	0	0	0	0.	0.	0.	0.
95	\$\$\$		14.29	0	0	0	0.	0.	0.	0.
96	25K	V25	14.29	0	0	0	0.	0.	0.	0.
97	50K	V50	14.29	2	2	0	1.26	0.	1.26	33.33
98	75K	V75	14.29	2	2	0	1.26	0.	1.26	33.33
99	100K	V100	14.29	1	1	0	.63	0.	.63	16.67
100	500K	V500	14.29	1	1	0	.63	0.	.63	16.67
101	????		14.29	0	0	0	0.	0.	0.	0.
102	\$\$\$		14.29	0	0	0	0.	0.	0.	0.
103	25L	V25	14.29	1	1	0	.63	0.	.63	20.00
104	50L	V50	14.29	2	2	0	1.26	0.	1.26	40.00
105	75L	V75	14.29	0	0	0	0.	0.	0.	0.
106	100L	V100	14.29	0	0	0	0.	0.	0.	0.
107	500L	V500	14.29	2	2	0	1.26	0.	1.26	40.00
108	????		14.29	0	0	0	0.	0.	0.	0.
109	\$\$\$		14.29	0	0	0	0.	0.	0.	0.
110	25M	V25	14.29	1	1	0	.63	0.	.63	50.00
111	50M	V50	14.29	0	0	0	0.	0.	0.	0.
112	75M	V75	14.29	0	0	0	0.	0.	0.	0.
113	100M	V100	14.29	0	0	0	0.	0.	0.	0.
114	500M	V500	14.29	1	1	0	.63	0.	.63	50.00
115	????		14.29	0	0	0	0.	0.	0.	0.
116	\$\$\$		14.29	0	0	0	0.	0.	0.	0.
117	25N	V25	14.29	0	0	0	0.	0.	0.	0.
118	50N	V50	14.29	0	0	0	0.	0.	0.	0.
119	75N	V75	14.29	0	0	0	0.	0.	0.	0.
120	100N	V100	14.29	0	0	0	0.	0.	0.	0.
121	500N	V500	14.29	1	1	0	.63	0.	.63	100.00
122	????		14.29	0	0	0	0.	0.	0.	0.
123	\$\$\$		14.29	0	0	0	0.	0.	0.	0.
124	25O	V25	14.29	0	0	0	0.	0.	0.	0.
125	50O	V50	14.29	0	0	0	0.	0.	0.	0.
126	75O	V75	14.29	0	0	0	0.	0.	0.	0.
127	100O	V100	14.29	0	0	0	0.	0.	0.	0.
128	500O	V500	14.29	1	1	0	.63	0.	.63	100.00
129	????		14.29	0	0	0	0.	0.	0.	0.
130	\$\$\$		14.29	0	0	0	0.	0.	0.	0.
131	25P	V25	14.29	0	0	0	0.	0.	0.	0.
132	50P	V50	14.29	0	0	0	0.	0.	0.	0.
133	75P	V75	14.29	0	0	0	0.	0.	0.	0.
134	100P	V100	14.29	0	0	0	0.	0.	0.	0.
135	500P	V500	14.29	0	0	0	0.	0.	0.	0.
136	????		14.29	0	0	0	0.	0.	0.	0.
137	\$\$\$		14.29	0	0	0	0.	0.	0.	0.

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EXHIBIT D-11. LOGIC TREE FOR ANALYZING FREQUENCY OF SIDE  
HOLES IN LONGITUDINAL AND VERTICAL MATRIX

*****										
NO.	NAME	EVENT	WEIGHT	ALL						
				--F--	--C--	--N/D--	--S1--	--S2--	--PT--	--PP--
1	LEVO	PAS	100.00	88	347	0	100.00	0.	100.00	100.00
2	BOW	BOW1	25.00	62	62	0	70.45	0.	70.45	70.45
3	STPH	STEP	25.00	21	21	0	23.86	0.	23.86	23.86
4	????		25.00	0	0	0	0.	0.	0.	0.
5	1111		25.00	5	5	0	5.68	0.	5.68	5.68
6	B10	CP10	10.00	24	24	0	27.27	0.	27.27	38.71
7	B20	CP20	10.00	8	8	0	9.09	0.	9.09	12.90
8	B30	CP30	10.00	13	13	0	14.77	0.	14.77	20.97
9	B40	CP40	10.00	6	6	0	6.82	0.	6.82	9.68
10	B50	CP50	10.00	4	4	0	4.55	0.	4.55	6.45
11	B60	CP60	10.00	3	3	0	3.41	0.	3.41	4.84
12	B70	CP70	10.00	2	2	0	2.27	0.	2.27	3.23
13	B99	CP99	10.00	0	0	0	0.	0.	0.	0.
14	????		10.00	0	0	0	0.	0.	0.	0.
15	1111		10.00	2	2	0	2.27	0.	2.27	3.23
16	S10	CP10	10.00	6	6	0	6.82	0.	6.82	28.57
17	S20	CP20	10.00	9	9	0	10.23	0.	10.23	42.86
18	S30	CP30	10.00	3	3	0	3.41	0.	3.41	14.29
19	S40	CP40	10.00	3	3	0	3.41	0.	3.41	14.29
20	S50	CP50	10.00	0	0	0	0.	0.	0.	0.
21	S60	CP60	10.00	0	0	0	0.	0.	0.	0.
22	S70	CP70	10.00	0	0	0	0.	0.	0.	0.
23	S99	CP99	10.00	0	0	0	0.	0.	0.	0.
24	????		10.00	0	0	0	0.	0.	0.	0.
25	1111		10.00	0	0	0	0.	0.	0.	0.
26	25A	V25	14.29	4	4	0	4.55	0.	4.55	16.67
27	50A	V50	14.29	5	5	0	5.68	0.	5.68	20.83
28	75A	V75	14.29	5	5	0	5.68	0.	5.68	20.83
29	100A	V100	14.29	5	5	0	5.68	0.	5.68	20.83
30	500A	V500	14.29	3	3	0	3.41	0.	3.41	12.50
31	????		14.29	0	0	0	0.	0.	0.	0.
32	1111		14.29	2	2	0	2.27	0.	2.27	8.33
33	25B	V25	14.29	2	2	0	2.27	0.	2.27	25.00
34	50B	V50	14.29	3	3	0	3.41	0.	3.41	37.50
35	75B	V75	14.29	1	1	0	1.14	0.	1.14	12.50
36	100B	V100	14.29	2	2	0	2.27	0.	2.27	25.00
37	500B	V500	14.29	0	0	0	0.	0.	0.	0.
38	????		14.29	0	0	0	0.	0.	0.	0.
39	1111		14.29	0	0	0	0.	0.	0.	0.
40	25C	V25	14.29	0	0	0	0.	0.	0.	0.
41	50C	V50	14.29	3	3	0	3.41	0.	3.41	23.08
42	75C	V75	14.29	3	3	0	3.41	0.	3.41	23.08
43	100C	V100	14.29	4	4	0	4.55	0.	4.55	30.77
44	500C	V500	14.29	3	3	0	3.41	0.	3.41	23.08
45	????		14.29	0	0	0	0.	0.	0.	0.
46	1111		14.29	0	0	0	0.	0.	0.	0.
47	25D	V25	14.29	1	1	0	1.14	0.	1.14	16.67
48	50D	V50	14.29	1	1	0	1.14	0.	1.14	16.67
49	75D	V75	14.29	2	2	0	2.27	0.	2.27	33.33
50	100D	V100	14.29	0	0	0	0.	0.	0.	0.
51	500D	V500	14.29	2	2	0	2.27	0.	2.27	33.33
52	????		14.29	0	0	0	0.	0.	0.	0.
53	1111		14.29	0	0	0	0.	0.	0.	0.
54	25E	V25	14.29	0	0	0	0.	0.	0.	0.
55	50E	V50	14.29	2	2	0	2.27	0.	2.27	50.00
56	75E	V75	14.29	1	1	0	1.14	0.	1.14	25.00
57	100E	V100	14.29	1	1	0	1.14	0.	1.14	25.00
58	500E	V500	14.29	0	0	0	0.	0.	0.	0.
59	????		14.29	0	0	0	0.	0.	0.	0.
60	1111		14.29	0	0	0	0.	0.	0.	0.
61	25F	V25	14.29	0	0	0	0.	0.	0.	0.
62	50F	V50	14.29	1	1	0	1.14	0.	1.14	33.33
63	75F	V75	14.29	0	0	0	0.	0.	0.	0.
64	100F	V100	14.29	1	1	0	1.14	0.	1.14	33.33
65	500F	V500	14.29	0	0	0	0.	0.	0.	0.
66	????		14.29	0	0	0	0.	0.	0.	0.

## EXHIBIT D-11. (Continued)

67	1111	14.29	1	1	0	1.14	0.	1.14	33.33
68	256 V25	14.29	0	0	0	0.	0.	0.	0.
69	506 V50	14.29	0	0	0	0.	0.	0.	0.
70	756 V75	14.29	0	0	0	0.	0.	0.	0.
71	1006 V100	14.29	1	1	0	1.14	0.	1.14	50.00
72	5006 V500	14.29	1	1	0	1.14	0.	1.14	50.00
73	????	14.29	0	0	0	0.	0.	0.	0.
74	1111	14.29	0	0	0	0.	0.	0.	0.
75	25H V25	14.29	0	0	0	0.	0.	0.	0.
76	50H V50	14.29	0	0	0	0.	0.	0.	0.
77	75H V75	14.29	0	0	0	0.	0.	0.	0.
78	100H V100	14.29	0	0	0	0.	0.	0.	0.
79	500H V500	14.29	0	0	0	0.	0.	0.	0.
80	????	14.29	0	0	0	0.	0.	0.	0.
81	1111	14.29	0	0	0	0.	0.	0.	0.
82	25I V25	14.29	0	0	0	0.	0.	0.	0.
83	50I V50	14.29	3	3	0	3.41	0.	3.41	50.00
84	75I V75	14.29	2	2	0	2.27	0.	2.27	33.33
85	100I V100	14.29	0	0	0	0.	0.	0.	0.
86	500I V500	14.29	1	1	0	1.14	0.	1.14	16.67
87	????	14.29	0	0	0	0.	0.	0.	0.
88	1111	14.29	0	0	0	0.	0.	0.	0.
89	25J V25	14.29	2	2	0	2.27	0.	2.27	22.22
90	50J V50	14.29	2	2	0	2.27	0.	2.27	22.22
91	75J V75	14.29	1	1	0	1.14	0.	1.14	11.11
92	100J V100	14.29	3	3	0	3.41	0.	3.41	33.33
93	500J V500	14.29	1	1	0	1.14	0.	1.14	11.11
94	????	14.29	0	0	0	0.	0.	0.	0.
95	1111	14.29	0	0	0	0.	0.	0.	0.
96	25K V25	14.29	0	0	0	0.	0.	0.	0.
97	50K V50	14.29	1	1	0	1.14	0.	1.14	33.33
98	75K V75	14.29	0	0	0	0.	0.	0.	0.
99	100K V100	14.29	0	0	0	0.	0.	0.	0.
100	500K V500	14.29	2	2	0	2.27	0.	2.27	66.67
101	????	14.29	0	0	0	0.	0.	0.	0.
102	1111	14.29	0	0	0	0.	0.	0.	0.
103	25L V25	14.29	1	1	0	1.14	0.	1.14	33.33
104	50L V50	14.29	1	1	0	1.14	0.	1.14	33.33
105	75L V75	14.29	1	1	0	1.14	0.	1.14	33.33
106	100L V100	14.29	0	0	0	0.	0.	0.	0.
107	500L V500	14.29	0	0	0	0.	0.	0.	0.
108	????	14.29	0	0	0	0.	0.	0.	0.
109	1111	14.29	0	0	0	0.	0.	0.	0.
110	25N V25	14.29	0	0	0	0.	0.	0.	0.
111	50N V50	14.29	0	0	0	0.	0.	0.	0.
112	75N V75	14.29	0	0	0	0.	0.	0.	0.
113	100N V100	14.29	0	0	0	0.	0.	0.	0.
114	500N V500	14.29	0	0	0	0.	0.	0.	0.
115	????	14.29	0	0	0	0.	0.	0.	0.
116	1111	14.29	0	0	0	0.	0.	0.	0.
117	25N V25	14.29	0	0	0	0.	0.	0.	0.
118	50N V50	14.29	0	0	0	0.	0.	0.	0.
119	75N V75	14.29	0	0	0	0.	0.	0.	0.
120	100N V100	14.29	0	0	0	0.	0.	0.	0.
121	500N V500	14.29	0	0	0	0.	0.	0.	0.
122	????	14.29	0	0	0	0.	0.	0.	0.
123	1111	14.29	0	0	0	0.	0.	0.	0.
124	25O V25	14.29	0	0	0	0.	0.	0.	0.
125	50O V50	14.29	0	0	0	0.	0.	0.	0.
126	75O V75	14.29	0	0	0	0.	0.	0.	0.
127	100O V100	14.29	0	0	0	0.	0.	0.	0.
128	500O V500	14.29	0	0	0	0.	0.	0.	0.
129	????	14.29	0	0	0	0.	0.	0.	0.
130	1111	14.29	0	0	0	0.	0.	0.	0.
131	25P V25	14.29	0	0	0	0.	0.	0.	0.
132	50P V50	14.29	0	0	0	0.	0.	0.	0.
133	75P V75	14.29	0	0	0	0.	0.	0.	0.
134	100P V100	14.29	0	0	0	0.	0.	0.	0.
135	500P V500	14.29	0	0	0	0.	0.	0.	0.
136	????	14.29	0	0	0	0.	0.	0.	0.
137	1111	14.29	0	0	0	0.	0.	0.	0.

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EXHIBIT D-12. LOGIC TREE FOR ANALYZING FREQUENCY OF SIDE WASTED  
THROUGH DAMAGE IN LONGITUDINAL AND VERTICAL MATRIX

*****										
NO.	NAME	EVENT	WEIGHT	ALL	--P--	--C--	-N/D-	--S1--	--S2--	--PT-- --FP--
1	LEVO	PAC	100.00	5	22	0	100.00	0.	100.00	100.00
2	BDM	BDM1	25.00	4	4	0	80.00	0.	80.00	80.00
3	STFN	STEP	25.00	0	0	0	0.	0.	0.	0.
4	????		25.00	0	0	0	0.	0.	0.	0.
5	1111		25.00	1	1	0	20.00	0.	20.00	20.00
6	B10	CP10	10.00	2	2	0	40.00	0.	40.00	50.00
7	B20	CP20	10.00	0	0	0	0.	0.	0.	0.
8	B30	CP30	10.00	0	0	0	0.	0.	0.	0.
9	B40	CP40	10.00	0	0	0	0.	0.	0.	0.
10	B50	CP50	10.00	2	2	0	40.00	0.	40.00	50.00
11	B60	CP60	10.00	0	0	0	0.	0.	0.	0.
12	B70	CP70	10.00	0	0	0	0.	0.	0.	0.
13	B99	CP99	10.00	0	0	0	0.	0.	0.	0.
14	????		10.00	0	0	0	0.	0.	0.	0.
15	1111		10.00	0	0	0	0.	0.	0.	0.
16	S10	CP10	10.00	0	0	0	0.	0.	0.	0.
17	S20	CP20	10.00	0	0	0	0.	0.	0.	0.
18	S30	CP30	10.00	0	0	0	0.	0.	0.	0.
19	S40	CP40	10.00	0	0	0	0.	0.	0.	0.
20	S50	CP50	10.00	0	0	0	0.	0.	0.	0.
21	S60	CP60	10.00	0	0	0	0.	0.	0.	0.
22	S70	CP70	10.00	0	0	0	0.	0.	0.	0.
23	S99	CP99	10.00	0	0	0	0.	0.	0.	0.
24	????		10.00	0	0	0	0.	0.	0.	0.
25	1111		10.00	0	0	0	0.	0.	0.	0.
26	25A	V25	14.29	0	0	0	0.	0.	0.	0.
27	50A	V50	14.29	1	1	0	20.00	0.	20.00	50.00
28	75A	V75	14.29	1	1	0	20.00	0.	20.00	50.00
29	100A	V100	14.29	0	0	0	0.	0.	0.	0.
30	500A	V500	14.29	0	0	0	0.	0.	0.	0.
31	????		14.29	0	0	0	0.	0.	0.	0.
32	1111		14.29	0	0	0	0.	0.	0.	0.
33	25B	V25	14.29	0	0	0	0.	0.	0.	0.
34	50B	V50	14.29	0	0	0	0.	0.	0.	0.
35	75B	V75	14.29	0	0	0	0.	0.	0.	0.
36	100B	V100	14.29	0	0	0	0.	0.	0.	0.
37	500B	V500	14.29	0	0	0	0.	0.	0.	0.
38	????		14.29	0	0	0	0.	0.	0.	0.
39	1111		14.29	0	0	0	0.	0.	0.	0.
40	25C	V25	14.29	0	0	0	0.	0.	0.	0.
41	50C	V50	14.29	0	0	0	0.	0.	0.	0.
42	75C	V75	14.29	0	0	0	0.	0.	0.	0.
43	100C	V100	14.29	0	0	0	0.	0.	0.	0.
44	500C	V500	14.29	0	0	0	0.	0.	0.	0.
45	????		14.29	0	0	0	0.	0.	0.	0.
46	1111		14.29	0	0	0	0.	0.	0.	0.
47	25D	V25	14.29	0	0	0	0.	0.	0.	0.
48	50D	V50	14.29	0	0	0	0.	0.	0.	0.
49	75D	V75	14.29	0	0	0	0.	0.	0.	0.
50	100D	V100	14.29	0	0	0	0.	0.	0.	0.
51	500D	V500	14.29	0	0	0	0.	0.	0.	0.
52	????		14.29	0	0	0	0.	0.	0.	0.
53	1111		14.29	0	0	0	0.	0.	0.	0.
54	25E	V25	14.29	0	0	0	0.	0.	0.	0.
55	50E	V50	14.29	2	2	0	40.00	0.	40.00	100.00
56	75E	V75	14.29	0	0	0	0.	0.	0.	0.
57	100E	V100	14.29	0	0	0	0.	0.	0.	0.
58	500E	V500	14.29	0	0	0	0.	0.	0.	0.
59	????		14.29	0	0	0	0.	0.	0.	0.
60	1111		14.29	0	0	0	0.	0.	0.	0.
61	25F	V25	14.29	0	0	0	0.	0.	0.	0.
62	50F	V50	14.29	0	0	0	0.	0.	0.	0.
63	75F	V75	14.29	0	0	0	0.	0.	0.	0.
64	100F	V100	14.29	0	0	0	0.	0.	0.	0.
65	500F	V500	14.29	0	0	0	0.	0.	0.	0.
66	????		14.29	0	0	0	0.	0.	0.	0.

## EXHIBIT D-12. (Continued)

67	1111	14.29	0	0	0	0.	0.	0.	0.
68	25G V25	14.29	0	0	0	0.	0.	0.	0.
69	50G V50	14.29	0	0	0	0.	0.	0.	0.
70	75G V75	14.29	0	0	0	0.	0.	0.	0.
71	100G V100	14.29	0	0	0	0.	0.	0.	0.
72	500G V500	14.29	0	0	0	0.	0.	0.	0.
73	1111	14.29	0	0	0	0.	0.	0.	0.
74	1111	14.29	0	0	0	0.	0.	0.	0.
75	25H V25	14.29	0	0	0	0.	0.	0.	0.
76	50H V50	14.29	0	0	0	0.	0.	0.	0.
77	75H V75	14.29	0	0	0	0.	0.	0.	0.
78	100H V100	14.29	0	0	0	0.	0.	0.	0.
79	500H V500	14.29	0	0	0	0.	0.	0.	0.
80	1111	14.29	0	0	0	0.	0.	0.	0.
81	1111	14.29	0	0	0	0.	0.	0.	0.
82	25I V25	14.29	0	0	0	0.	0.	0.	0.
83	50I V50	14.29	0	0	0	0.	0.	0.	0.
84	75I V75	14.29	0	0	0	0.	0.	0.	0.
85	100I V100	14.29	0	0	0	0.	0.	0.	0.
86	500I V500	14.29	0	0	0	0.	0.	0.	0.
87	1111	14.29	0	0	0	0.	0.	0.	0.
88	1111	14.29	0	0	0	0.	0.	0.	0.
89	25J V25	14.29	0	0	0	0.	0.	0.	0.
90	50J V50	14.29	0	0	0	0.	0.	0.	0.
91	75J V75	14.29	0	0	0	0.	0.	0.	0.
92	100J V100	14.29	0	0	0	0.	0.	0.	0.
93	500J V500	14.29	0	0	0	0.	0.	0.	0.
94	1111	14.29	0	0	0	0.	0.	0.	0.
95	1111	14.29	0	0	0	0.	0.	0.	0.
96	25K V25	14.29	0	0	0	0.	0.	0.	0.
97	50K V50	14.29	0	0	0	0.	0.	0.	0.
98	75K V75	14.29	0	0	0	0.	0.	0.	0.
99	100K V100	14.29	0	0	0	0.	0.	0.	0.
100	500K V500	14.29	0	0	0	0.	0.	0.	0.
101	1111	14.29	0	0	0	0.	0.	0.	0.
102	1111	14.29	0	0	0	0.	0.	0.	0.
103	25L V25	14.29	0	0	0	0.	0.	0.	0.
104	50L V50	14.29	0	0	0	0.	0.	0.	0.
105	75L V75	14.29	0	0	0	0.	0.	0.	0.
106	100L V100	14.29	0	0	0	0.	0.	0.	0.
107	500L V500	14.29	0	0	0	0.	0.	0.	0.
108	1111	14.29	0	0	0	0.	0.	0.	0.
109	1111	14.29	0	0	0	0.	0.	0.	0.
110	25M V25	14.29	0	0	0	0.	0.	0.	0.
111	50M V50	14.29	0	0	0	0.	0.	0.	0.
112	75M V75	14.29	0	0	0	0.	0.	0.	0.
113	100M V100	14.29	0	0	0	0.	0.	0.	0.
114	500M V500	14.29	0	0	0	0.	0.	0.	0.
115	1111	14.29	0	0	0	0.	0.	0.	0.
116	1111	14.29	0	0	0	0.	0.	0.	0.
117	25N V25	14.29	0	0	0	0.	0.	0.	0.
118	50N V50	14.29	0	0	0	0.	0.	0.	0.
119	75N V75	14.29	0	0	0	0.	0.	0.	0.
120	100N V100	14.29	0	0	0	0.	0.	0.	0.
121	500N V500	14.29	0	0	0	0.	0.	0.	0.
122	1111	14.29	0	0	0	0.	0.	0.	0.
123	1111	14.29	0	0	0	0.	0.	0.	0.
124	25O V25	14.29	0	0	0	0.	0.	0.	0.
125	50O V50	14.29	0	0	0	0.	0.	0.	0.
126	75O V75	14.29	0	0	0	0.	0.	0.	0.
127	100O V100	14.29	0	0	0	0.	0.	0.	0.
128	500O V500	14.29	0	0	0	0.	0.	0.	0.
129	1111	14.29	0	0	0	0.	0.	0.	0.
130	1111	14.29	0	0	0	0.	0.	0.	0.
131	25P V25	14.29	0	0	0	0.	0.	0.	0.
132	50P V50	14.29	0	0	0	0.	0.	0.	0.
133	75P V75	14.29	0	0	0	0.	0.	0.	0.
134	100P V100	14.29	0	0	0	0.	0.	0.	0.
135	500P V500	14.29	0	0	0	0.	0.	0.	0.
136	1111	14.29	0	0	0	0.	0.	0.	0.
137	1111	14.29	0	0	0	0.	0.	0.	0.

## EXHIBIT D-13. LOGIC TREE FOR ANALYZING CRACK LENGTH

*****										
NODE NAME?			ALL							
NO.	NAME	EVENT	WEIGHT	--F--	--C--	--N/D--	--S1--	--S2--	--PT--	--PP--
1	LEVO	CFAR	100.00	436	1289	0	100.00	0.	100.00	100.00
2	PAS	PAS	7.14	159	159	0	36.47	0.	36.47	36.47
3	PAB	PAB	7.14	57	57	0	13.07	0.	13.07	13.07
4	PAD	PAD	7.14	17	17	0	3.90	0.	3.90	3.90
5	PAE	PAE	7.14	49	49	0	11.24	0.	11.24	11.24
6	KSB	KSB	7.14	37	37	0	8.49	0.	8.49	8.49
7	KSD	KSD	7.14	30	30	0	6.88	0.	6.88	6.88
8	KES	KES	7.14	33	33	0	7.57	0.	7.57	7.57
9	KED	KED	7.14	22	22	0	5.05	0.	5.05	5.05
10	KEB	KEB	7.14	7	7	0	1.61	0.	1.61	1.61
11	UPC	UPC	7.14	9	9	0	2.06	0.	2.06	2.06
12	LWC	LWC	7.14	7	7	0	1.61	0.	1.61	1.61
13	COM	COM	7.14	5	5	0	1.15	0.	1.15	1.15
14	????		7.14	0	0	0	0.	0.	0.	0.
15	\$\$\$		7.14	4	4	0	.92	0.	.92	.92
16	L1A	LLT1	14.29	70	70	0	16.06	0.	16.06	44.03
17	L3A	LLT3	14.29	15	15	0	3.44	0.	3.44	9.43
18	L6A	LLT6	14.29	7	7	0	1.61	0.	1.61	4.40
19	L10A	LL10	14.29	5	5	0	1.15	0.	1.15	3.14
20	L11A	LG10	14.29	10	10	0	2.29	0.	2.29	6.29
21	????		14.29	0	0	0	0.	0.	0.	0.
22	\$\$\$		14.29	52	52	0	11.93	0.	11.93	32.70
23	L1B	LLT1	14.29	18	18	0	4.13	0.	4.13	31.58
24	L3B	LLT3	14.29	2	2	0	.46	0.	.46	3.51
25	L6B	LLT6	14.29	0	0	0	0.	0.	0.	0.
26	L10B	LL10	14.29	0	0	0	0.	0.	0.	0.
27	L11B	LG10	14.29	9	9	0	2.06	0.	2.06	15.79
28	????		14.29	0	0	0	0.	0.	0.	0.
29	\$\$\$		14.29	28	28	0	6.42	0.	6.42	49.12
30	L1C	LLT1	14.29	3	3	0	.69	0.	.69	17.65
31	L3C	LLT3	14.29	1	1	0	.23	0.	.23	5.88
32	L6C	LLT6	14.29	1	1	0	.23	0.	.23	5.88
33	L10C	LL10	14.29	0	0	0	0.	0.	0.	0.
34	L11C	LG10	14.29	2	2	0	.46	0.	.46	11.76
35	????		14.29	0	0	0	0.	0.	0.	0.
36	\$\$\$		14.29	10	10	0	2.29	0.	2.29	58.22
37	L1D	LLT1	14.29	15	15	0	3.44	0.	3.44	30.61
38	L3D	LLT3	14.29	12	12	0	2.75	0.	2.75	24.49
39	L6D	LLT6	14.29	7	7	0	1.61	0.	1.61	14.29
40	L10D	LL10	14.29	2	2	0	.46	0.	.46	4.08
41	L11D	LG10	14.29	4	4	0	.92	0.	.92	8.16
42	????		14.29	0	0	0	0.	0.	0.	0.
43	\$\$\$		14.29	9	9	0	2.06	0.	2.06	18.37
44	L1E	LLT1	14.29	5	5	0	1.15	0.	1.15	13.51
45	L3E	LLT3	14.29	8	8	0	1.83	0.	1.83	21.62
46	L6E	LLT6	14.29	2	2	0	.46	0.	.46	5.41
47	L10E	LL10	14.29	1	1	0	.23	0.	.23	2.70
48	L11E	LG10	14.29	9	9	0	2.06	0.	2.06	24.32
49	????		14.29	0	0	0	0.	0.	0.	0.
50	\$\$\$		14.29	12	12	0	2.75	0.	2.75	32.43
51	L1F	LLT1	14.29	3	3	0	.69	0.	.69	10.00
52	L3F	LLT3	14.29	3	3	0	.69	0.	.69	10.00
53	L6F	LLT6	14.29	2	2	0	.46	0.	.46	6.67
54	L10F	LL10	14.29	3	3	0	.69	0.	.69	10.00
55	L11F	LG10	14.29	3	3	0	.69	0.	.69	10.00
56	????		14.29	0	0	0	0.	0.	0.	0.
57	\$\$\$		14.29	16	16	0	3.67	0.	3.67	53.33
58	L1G	LLT1	14.29	12	12	0	2.75	0.	2.75	36.36
59	L3G	LLT3	14.29	3	3	0	.69	0.	.69	9.09
60	L6G	LLT6	14.29	1	1	0	.23	0.	.23	3.03
61	L10G	LL10	14.29	4	4	0	.92	0.	.92	12.12
62	L11G	LG10	14.29	0	0	0	0.	0.	0.	0.
63	????		14.29	0	0	0	0.	0.	0.	0.

## EXHIBIT D-13. (Continued)

64	1111	14.29	13	13	0	2.98	0.	2.98	39.39
65	L1H LLT1	14.29	7	7	0	1.61	0.	1.61	31.82
66	L3H LLT3	14.29	3	3	0	.69	0.	.69	13.64
67	L6H LLT6	14.29	4	4	0	.92	0.	.92	18.18
68	L10H LL10	14.29	1	1	0	.23	0.	.23	4.55
69	L11H LG10	14.29	2	2	0	.46	0.	.46	9.09
70	????	14.29	0	0	0	0.	0.	0.	0.
71	1111	14.29	5	5	0	1.15	0.	1.15	22.73
72	L1I LLT1	14.29	0	0	0	0.	0.	0.	0.
73	L3I LLT3	14.29	1	1	0	.23	0.	.23	14.29
74	L6I LLT6	14.29	0	0	0	0.	0.	0.	0.
75	L10I LL10	14.29	1	1	0	.23	0.	.23	14.29
76	L11I LG10	14.29	0	0	0	0.	0.	0.	0.
77	????	14.29	0	0	0	0.	0.	0.	0.
78	1111	14.29	5	5	0	1.15	0.	1.15	71.43
79	L1J LLT1	14.29	3	3	0	.69	0.	.69	33.33
80	L3J LLT3	14.29	0	0	0	0.	0.	0.	0.
81	L6J LLT6	14.29	1	1	0	.23	0.	.23	11.11
82	L10J LL10	14.29	0	0	0	0.	0.	0.	0.
83	L11J LG10	14.29	1	1	0	.23	0.	.23	11.11
84	????	14.29	0	0	0	0.	0.	0.	0.
85	1111	14.29	4	4	0	.92	0.	.92	44.44
86	L1K LLT1	14.29	1	1	0	.23	0.	.23	14.29
87	L3K LLT3	14.29	0	0	0	0.	0.	0.	0.
88	L6K LLT6	14.29	1	1	0	.23	0.	.23	14.29
89	L10K LL10	14.29	0	0	0	0.	0.	0.	0.
90	L11K LG10	14.29	1	1	0	.23	0.	.23	14.29
91	????	14.29	0	0	0	0.	0.	0.	0.
92	1111	14.29	4	4	0	.92	0.	.92	57.14
93	L1L LLT1	14.29	0	0	0	0.	0.	0.	0.
94	L3L LLT3	14.29	0	0	0	0.	0.	0.	0.
95	L6L LLT6	14.29	1	1	0	.23	0.	.23	20.00
96	L10L LL10	14.29	0	0	0	0.	0.	0.	0.
97	L11L LG10	14.29	1	1	0	.23	0.	.23	20.00
98	????	14.29	0	0	0	0.	0.	0.	0.
99	1111	14.29	3	3	0	.69	0.	.69	60.00

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## EXHIBIT D-14. LOGIC TREE FOR ANALYZING AREA OF HOLED DAMAGE

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NODE NUMBER				ALL					
NO.	NAME	EVENT	HEIGHT	--F--	--C--	--H--	--1--	--2--	--PT-- --PF--
1	LEVO	HOLE	100.00	347	1289	0	100.00	0.	100.00 100.00
2	PAB	PAB	7.14	88	88	0	25.36	0.	25.36 25.36
3	PAB	PAB	7.14	74	74	0	21.33	0.	21.33 21.33
4	PAB	PAB	7.14	11	11	0	3.17	0.	3.17 3.17
5	PAB	PAB	7.14	42	42	0	12.10	0.	12.10 12.10
6	KSD	KSD	7.14	37	37	0	10.66	0.	10.66 10.66
7	KSD	KSD	7.14	16	16	0	4.61	0.	4.61 4.61
8	KSD	KSD	7.14	19	19	0	5.48	0.	5.48 5.48
9	KSD	KSD	7.14	17	17	0	4.90	0.	4.90 4.90
10	KSD	KSD	7.14	20	20	0	5.76	0.	5.76 5.76
11	KSD	KSD	7.14	2	2	0	.58	0.	.58 .58
12	KSD	KSD	7.14	13	13	0	3.75	0.	3.75 3.75
13	KSD	KSD	7.14	5	5	0	1.44	0.	1.44 1.44
14	KSD	KSD	7.14	0	0	0	0.	0.	0. 0.
15	KSD	KSD	7.14	3	3	0	.86	0.	.86 .86
16	ARLH	L100	33.33	74	74	0	21.33	0.	21.33 84.09
17	????		33.33	0	0	0	0.	0.	0. 0.
18	????		33.33	14	14	0	4.03	0.	4.03 15.91
19	ARLH	L100	33.33	58	58	0	16.71	0.	16.71 78.38
20	????		33.33	0	0	0	0.	0.	0. 0.
21	????		33.33	16	16	0	4.61	0.	4.61 21.62
22	ARLH	L100	33.33	10	10	0	2.88	0.	2.88 90.91
23	????		33.33	0	0	0	0.	0.	0. 0.
24	????		33.33	1	1	0	.29	0.	.29 9.09
25	ARLH	L100	33.33	39	39	0	11.24	0.	11.24 92.86
26	????		33.33	0	0	0	0.	0.	0. 0.
27	????		33.33	3	3	0	.86	0.	.86 7.14
28	ARLH	L100	33.33	25	25	0	7.20	0.	7.20 67.57
29	????		33.33	0	0	0	0.	0.	0. 0.
30	????		33.33	12	12	0	3.46	0.	3.46 32.43
31	ARLH	L100	33.33	4	4	0	1.15	0.	1.15 25.00
32	????		33.33	0	0	0	0.	0.	0. 0.
33	????		33.33	12	12	0	3.46	0.	3.46 75.00
34	ARLH	L100	33.33	12	12	0	3.46	0.	3.46 63.16
35	????		33.33	0	0	0	0.	0.	0. 0.
36	????		33.33	7	7	0	2.02	0.	2.02 36.84
37	ARLH	L100	33.33	9	9	0	2.59	0.	2.59 52.94
38	????		33.33	0	0	0	0.	0.	0. 0.
39	????		33.33	8	8	0	2.31	0.	2.31 47.06
40	ARLH	L100	33.33	12	12	0	3.46	0.	3.46 60.00
41	????		33.33	0	0	0	0.	0.	0. 0.
42	????		33.33	8	8	0	2.31	0.	2.31 40.00
43	ARLH	L100	33.33	2	2	0	.58	0.	.58 100.00
44	????		33.33	0	0	0	0.	0.	0. 0.
45	????		33.33	0	0	0	0.	0.	0. 0.
46	ARLH	L100	33.33	3	3	0	.86	0.	.86 23.03
47	????		33.33	0	0	0	0.	0.	0. 0.
48	????		33.33	10	10	0	2.88	0.	2.88 76.92
49	ARLH	L100	33.33	0	0	0	0.	0.	0. 0.
50	????		33.33	0	0	0	0.	0.	0. 0.
51	????		33.33	5	5	0	1.44	0.	1.44 100.00
52	ALA	ALT1	12.50	32	32	0	9.22	0.	9.22 43.24
53	ALA	ALT2	12.50	5	5	0	1.44	0.	1.44 6.76
54	ALA	ALT3	12.50	3	3	0	.86	0.	.86 4.05
55	ALA	ALT5	12.50	0	0	0	0.	0.	0. 0.
56	ALA	ALT10	12.50	9	9	0	2.59	0.	2.59 12.16
57	ALA	ALT10	12.50	23	23	0	6.63	0.	6.63 31.08
58	????		12.50	0	0	0	0.	0.	0. 0.
59	????		12.50	2	2	0	.58	0.	.58 2.70
60	ALA	ALT1	12.50	31	31	0	8.93	0.	8.93 53.45
61	ALA	ALT2	12.50	2	2	0	.58	0.	.58 3.45
62	ALA	ALT3	12.50	0	0	0	0.	0.	0. 0.
63	ALA	ALT5	12.50	4	4	0	1.15	0.	1.15 6.90
64	ALA	ALT10	12.50	4	4	0	1.15	0.	1.15 6.90
65	ALA	ALT10	12.50	15	15	0	4.32	0.	4.32 25.86
66	????		12.50	0	0	0	0.	0.	0. 0.
67	????		12.50	2	2	0	.58	0.	.58 3.45
68	ALA	ALT1	12.50	3	3	0	.86	0.	.86 30.00
69	ALA	ALT2	12.50	0	0	0	0.	0.	0. 0.
70	ALA	ALT3	12.50	1	1	0	.29	0.	.29 10.00
71	ALA	ALT5	12.50	0	0	0	0.	0.	0. 0.
72	ALA	ALT10	12.50	1	1	0	.29	0.	.29 10.00
73	ALA	ALT10	12.50	5	5	0	1.44	0.	1.44 50.00
74	????		12.50	0	0	0	0.	0.	0. 0.
75	????		12.50	0	0	0	0.	0.	0. 0.

## EXHIBIT D-14. (Continued)

76	AD	ALT1	12.50	18	18	0	5.19	0.	5.19	46.15
77	AD	ALT2	12.50	1	1	0	.29	0.	.29	2.56
78	AD	ALT3	12.50	1	1	0	.29	0.	.29	2.56
79	AD	ALT5	12.50	5	5	0	1.44	0.	1.44	12.82
80	AD	ALT10	12.50	5	5	0	1.44	0.	1.44	12.82
81	AD	ALT10	12.50	9	9	0	2.59	0.	2.59	23.08
82	???		12.50	0	0	0	0.	0.	0.	0.
83	???		12.50	0	0	0	0.	0.	0.	0.
84	AD	ALT1	12.50	6	6	0	1.73	0.	1.73	24.00
85	AD	ALT2	12.50	1	1	0	.29	0.	.29	4.00
86	AD	ALT3	12.50	2	2	0	.58	0.	.58	8.00
87	AD	ALT5	12.50	4	4	0	1.15	0.	1.15	16.00
88	AD	ALT10	12.50	5	5	0	1.44	0.	1.44	20.00
89	AD	ALT10	12.50	7	7	0	2.02	0.	2.02	28.00
90	???		12.50	0	0	0	0.	0.	0.	0.
91	???		12.50	0	0	0	0.	0.	0.	0.
92	AD	ALT1	12.50	0	0	0	0.	0.	0.	0.
93	AD	ALT2	12.50	0	0	0	0.	0.	0.	0.
94	AD	ALT3	12.50	0	0	0	0.	0.	0.	0.
95	AD	ALT5	12.50	0	0	0	0.	0.	0.	0.
96	AD	ALT10	12.50	1	1	0	.29	0.	.29	25.00
97	AD	ALT10	12.50	3	3	0	.86	0.	.86	75.00
98	???		12.50	0	0	0	0.	0.	0.	0.
99	???		12.50	0	0	0	0.	0.	0.	0.
100	AD	ALT1	12.50	2	2	0	.58	0.	.58	16.67
101	AD	ALT2	12.50	0	0	0	0.	0.	0.	0.
102	AD	ALT3	12.50	0	0	0	0.	0.	0.	0.
103	AD	ALT5	12.50	3	3	0	.86	0.	.86	25.00
104	AD	ALT10	12.50	2	2	0	.58	0.	.58	16.67
105	AD	ALT10	12.50	4	4	0	1.15	0.	1.15	33.33
106	???		12.50	0	0	0	0.	0.	0.	0.
107	???		12.50	1	1	0	.29	0.	.29	8.33
108	AD	ALT1	12.50	2	2	0	.58	0.	.58	22.22
109	AD	ALT2	12.50	0	0	0	0.	0.	0.	0.
110	AD	ALT3	12.50	0	0	0	0.	0.	0.	0.
111	AD	ALT5	12.50	0	0	0	0.	0.	0.	0.
112	AD	ALT10	12.50	2	2	0	.58	0.	.58	22.22
113	AD	ALT10	12.50	5	5	0	1.44	0.	1.44	55.56
114	???		12.50	0	0	0	0.	0.	0.	0.
115	???		12.50	0	0	0	0.	0.	0.	0.
116	AD	ALT1	12.50	3	3	0	.86	0.	.86	25.00
117	AD	ALT2	12.50	1	1	0	.29	0.	.29	8.33
118	AD	ALT3	12.50	1	1	0	.29	0.	.29	8.33
119	AD	ALT5	12.50	0	0	0	0.	0.	0.	0.
120	AD	ALT10	12.50	1	1	0	.29	0.	.29	8.33
121	AD	ALT10	12.50	4	4	0	1.15	0.	1.15	33.33
122	???		12.50	0	0	0	0.	0.	0.	0.
123	???		12.50	2	2	0	.58	0.	.58	16.67
124	AD	ALT1	12.50	0	0	0	0.	0.	0.	0.
125	AD	ALT2	12.50	0	0	0	0.	0.	0.	0.
126	AD	ALT3	12.50	0	0	0	0.	0.	0.	0.
127	AD	ALT5	12.50	0	0	0	0.	0.	0.	0.
128	AD	ALT10	12.50	0	0	0	0.	0.	0.	0.
129	AD	ALT10	12.50	2	2	0	.58	0.	.58	100.00
130	???		12.50	0	0	0	0.	0.	0.	0.
131	???		12.50	0	0	0	0.	0.	0.	0.
132	AD	ALT1	12.50	1	1	0	.29	0.	.29	33.33
133	AD	ALT2	12.50	0	0	0	0.	0.	0.	0.
134	AD	ALT3	12.50	0	0	0	0.	0.	0.	0.
135	AD	ALT5	12.50	0	0	0	0.	0.	0.	0.
136	AD	ALT10	12.50	1	1	0	.29	0.	.29	33.33
137	AD	ALT10	12.50	1	1	0	.29	0.	.29	33.33
138	???		12.50	0	0	0	0.	0.	0.	0.
139	???		12.50	0	0	0	0.	0.	0.	0.
140	AD	ALT1	12.50	0	0	0	0.	0.	0.	0.
141	AD	ALT2	12.50	0	0	0	0.	0.	0.	0.
142	AD	ALT3	12.50	0	0	0	0.	0.	0.	0.
143	AD	ALT5	12.50	0	0	0	0.	0.	0.	0.
144	AD	ALT10	12.50	0	0	0	0.	0.	0.	0.
145	AD	ALT10	12.50	0	0	0	0.	0.	0.	0.
146	???		12.50	0	0	0	0.	0.	0.	0.
147	???		12.50	0	0	0	0.	0.	0.	0.

## EXHIBIT D-15. LOGIC TREE FOR ANALYZING AREA OF WASTED THROUGH DAMAGE

*****									
NODE NUMBER									
NO.	NODE EVENT	WORTH	FC	CC	CD	SI	SC	FT	FF
1	LEVO	100.00	2	1200	0	100.00	0.	100.00	100.00
2	FVS	7.14	5	5	0	22.73	0.	22.73	22.73
3	FVS	7.14	9	9	0	40.91	0.	40.91	40.91
4	FVS	7.14	0	0	0	0.	0.	0.	0.
5	FVS	7.14	2	2	0	9.09	0.	9.09	9.09
6	FVS	7.14	1	1	0	4.55	0.	4.55	4.55
7	FVS	7.14	2	2	0	9.09	0.	9.09	9.09
8	FVS	7.14	0	0	0	0.	0.	0.	0.
9	FVS	7.14	0	0	0	0.	0.	0.	0.
10	FVS	7.14	1	1	0	4.55	0.	4.55	4.55
11	FVS	7.14	0	0	0	0.	0.	0.	0.
12	FVS	7.14	1	1	0	4.55	0.	4.55	4.55
13	FVS	7.14	1	1	0	4.55	0.	4.55	4.55
14	????	7.14	0	0	0	0.	0.	0.	0.
15	????	7.14	0	0	0	0.	0.	0.	0.
16	AFLE L100	33.33	4	4	0	18.18	0.	18.18	80.00
17	????	33.33	0	0	0	0.	0.	0.	0.
18	????	33.33	1	1	0	4.55	0.	4.55	20.00
19	AFLE L100	33.33	8	8	0	36.36	0.	36.36	88.89
20	????	33.33	0	0	0	0.	0.	0.	0.
21	????	33.33	1	1	0	4.55	0.	4.55	11.11
22	AFLE L100	33.33	0	0	0	0.	0.	0.	0.
23	????	33.33	0	0	0	0.	0.	0.	0.
24	????	33.33	0	0	0	0.	0.	0.	0.
25	AFLE L100	33.33	2	2	0	9.09	0.	9.09	100.00
26	????	33.33	0	0	0	0.	0.	0.	0.
27	????	33.33	0	0	0	0.	0.	0.	0.
28	AFLE L100	33.33	1	1	0	4.55	0.	4.55	100.00
29	????	33.33	0	0	0	0.	0.	0.	0.
30	????	33.33	0	0	0	0.	0.	0.	0.
31	AFLE L100	33.33	2	2	0	9.09	0.	9.09	100.00
32	????	33.33	0	0	0	0.	0.	0.	0.
33	????	33.33	0	0	0	0.	0.	0.	0.
34	AFLE L100	33.33	0	0	0	0.	0.	0.	0.
35	????	33.33	0	0	0	0.	0.	0.	0.
36	????	33.33	0	0	0	0.	0.	0.	0.
37	AFLE L100	33.33	0	0	0	0.	0.	0.	0.
38	????	33.33	0	0	0	0.	0.	0.	0.
39	????	33.33	0	0	0	0.	0.	0.	0.
40	AFLE L100	33.33	0	0	0	0.	0.	0.	0.
41	????	33.33	0	0	0	0.	0.	0.	0.
42	????	33.33	1	1	0	4.55	0.	4.55	100.00
43	AFLE L100	33.33	0	0	0	0.	0.	0.	0.
44	????	33.33	0	0	0	0.	0.	0.	0.
45	????	33.33	0	0	0	0.	0.	0.	0.
46	AFLE L100	33.33	1	1	0	4.55	0.	4.55	100.00
47	????	33.33	0	0	0	0.	0.	0.	0.
48	????	33.33	0	0	0	0.	0.	0.	0.
49	AFLE L100	33.33	0	0	0	0.	0.	0.	0.
50	????	33.33	0	0	0	0.	0.	0.	0.
51	????	33.33	1	1	0	4.55	0.	4.55	100.00
52	ALT1	12.50	0	0	0	0.	0.	0.	0.
53	ALT2	12.50	0	0	0	0.	0.	0.	0.
54	ALT3	12.50	0	0	0	0.	0.	0.	0.
55	ALT5	12.50	1	1	0	4.55	0.	4.55	25.00
56	ALT10	12.50	0	0	0	0.	0.	0.	0.
57	ALT10	12.50	3	3	0	13.64	0.	13.64	75.00
58	????	12.50	0	0	0	0.	0.	0.	0.
59	????	12.50	0	0	0	0.	0.	0.	0.
60	ALT1	12.50	4	4	0	18.18	0.	18.18	50.00
61	ALT2	12.50	0	0	0	0.	0.	0.	0.
62	ALT3	12.50	0	0	0	0.	0.	0.	0.
63	ALT5	12.50	1	1	0	4.55	0.	4.55	12.50
64	ALT10	12.50	1	1	0	4.55	0.	4.55	12.50
65	ALT10	12.50	2	2	0	9.09	0.	9.09	25.00
66	????	12.50	0	0	0	0.	0.	0.	0.
67	????	12.50	0	0	0	0.	0.	0.	0.
68	ALT1	12.50	0	0	0	0.	0.	0.	0.
69	ALT2	12.50	0	0	0	0.	0.	0.	0.
70	ALT3	12.50	0	0	0	0.	0.	0.	0.
71	ALT5	12.50	0	0	0	0.	0.	0.	0.
72	ALT10	12.50	0	0	0	0.	0.	0.	0.
73	ALT10	12.50	0	0	0	0.	0.	0.	0.
74	????	12.50	0	0	0	0.	0.	0.	0.
75	????	12.50	0	0	0	0.	0.	0.	0.

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## EXHIBIT D-15. (Continued)

76	AID	ALT1	12.50	1	1	0	4.55	0.	4.55	50.00
77	AID	ALT2	12.50	0	0	0	0.	0.	0.	0.
78	AID	ALT3	12.50	0	0	0	0.	0.	0.	0.
79	AID	ALT5	12.50	0	0	0	0.	0.	0.	0.
80	AID	ALT10	12.50	0	0	0	0.	0.	0.	0.
81	AID	ALT10	12.50	1	1	0	4.55	0.	4.55	50.00
82	???		12.50	0	0	0	0.	0.	0.	0.
83	???		12.50	0	0	0	0.	0.	0.	0.
84	AIE	ALT1	12.50	0	0	0	0.	0.	0.	0.
85	AIE	ALT2	12.50	0	0	0	0.	0.	0.	0.
86	AIE	ALT3	12.50	0	0	0	0.	0.	0.	0.
87	AIE	ALT5	12.50	0	0	0	0.	0.	0.	0.
88	AIE	ALT10	12.50	0	0	0	0.	0.	0.	0.
89	AIE	ALT10	12.50	1	1	0	4.55	0.	4.55	100.00
90	???		12.50	0	0	0	0.	0.	0.	0.
91	???		12.50	0	0	0	0.	0.	0.	0.
92	AIF	ALT1	12.50	0	0	0	0.	0.	0.	0.
93	AIF	ALT2	12.50	0	0	0	0.	0.	0.	0.
94	AIF	ALT3	12.50	0	0	0	0.	0.	0.	0.
95	AIF	ALT5	12.50	0	0	0	0.	0.	0.	0.
96	AIF	ALT10	12.50	0	0	0	0.	0.	0.	0.
97	AIF	ALT10	12.50	2	2	0	9.09	0.	9.09	100.00
98	???		12.50	0	0	0	0.	0.	0.	0.
99	???		12.50	0	0	0	0.	0.	0.	0.
100	AIG	ALT1	12.50	0	0	0	0.	0.	0.	0.
101	AIG	ALT2	12.50	0	0	0	0.	0.	0.	0.
102	AIG	ALT3	12.50	0	0	0	0.	0.	0.	0.
103	AIG	ALT5	12.50	0	0	0	0.	0.	0.	0.
104	AIG	ALT10	12.50	0	0	0	0.	0.	0.	0.
105	AIG	ALT10	12.50	0	0	0	0.	0.	0.	0.
106	???		12.50	0	0	0	0.	0.	0.	0.
107	???		12.50	0	0	0	0.	0.	0.	0.
108	AIH	ALT1	12.50	0	0	0	0.	0.	0.	0.
109	AIH	ALT2	12.50	0	0	0	0.	0.	0.	0.
110	AIH	ALT3	12.50	0	0	0	0.	0.	0.	0.
111	???		12.50	0	0	0	0.	0.	0.	0.
112	AIO	ALT10	12.50	0	0	0	0.	0.	0.	0.
113	AIO	ALT10	12.50	0	0	0	0.	0.	0.	0.
114	???		12.50	0	0	0	0.	0.	0.	0.
115	???		12.50	0	0	0	0.	0.	0.	0.
116	AII	ALT1	12.50	0	0	0	0.	0.	0.	0.
117	AII	ALT2	12.50	0	0	0	0.	0.	0.	0.
118	AII	ALT3	12.50	0	0	0	0.	0.	0.	0.
119	AII	ALT5	12.50	0	0	0	0.	0.	0.	0.
120	AII	ALT10	12.50	0	0	0	0.	0.	0.	0.
121	AII	ALT10	12.50	0	0	0	0.	0.	0.	0.
122	???		12.50	0	0	0	0.	0.	0.	0.
123	???		12.50	0	0	0	0.	0.	0.	0.
124	AIJ	ALT1	12.50	0	0	0	0.	0.	0.	0.
125	AIJ	ALT2	12.50	0	0	0	0.	0.	0.	0.
126	AIJ	ALT3	12.50	0	0	0	0.	0.	0.	0.
127	AIJ	ALT5	12.50	0	0	0	0.	0.	0.	0.
128	AIJ	ALT10	12.50	0	0	0	0.	0.	0.	0.
129	AIJ	ALT10	12.50	0	0	0	0.	0.	0.	0.
130	???		12.50	0	0	0	0.	0.	0.	0.
131	???		12.50	0	0	0	0.	0.	0.	0.
132	AII	ALT1	12.50	0	0	0	0.	0.	0.	0.
133	AII	ALT2	12.50	0	0	0	0.	0.	0.	0.
134	AII	ALT3	12.50	0	0	0	0.	0.	0.	0.
135	AII	ALT5	12.50	0	0	0	0.	0.	0.	0.
136	AII	ALT10	12.50	0	0	0	0.	0.	0.	0.
137	AII	ALT10	12.50	1	1	0	4.55	0.	4.55	100.00
138	???		12.50	0	0	0	0.	0.	0.	0.
139	???		12.50	0	0	0	0.	0.	0.	0.
140	AII	ALT1	12.50	0	0	0	0.	0.	0.	0.
141	AII	ALT2	12.50	0	0	0	0.	0.	0.	0.
142	AII	ALT3	12.50	0	0	0	0.	0.	0.	0.
143	AII	ALT5	12.50	0	0	0	0.	0.	0.	0.
144	AII	ALT10	12.50	0	0	0	0.	0.	0.	0.
145	AII	ALT10	12.50	0	0	0	0.	0.	0.	0.
146	???		12.50	0	0	0	0.	0.	0.	0.
147	???		12.50	0	0	0	0.	0.	0.	0.

(90) ~~90~~  
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